

MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXIII.

Published every Thursday at 418-19 Perry-Payne Bldg., by the Marine Review Pub. Co.

CLEVELAND, O., MARCH 14, 1901.

Subscription \$3.00 a year.
Foreign \$4.50 a year.

No. 11

LAKE FREIGHT MATTERS.

A rumor that one of the ore shipping concerns of Cleveland had made a contract for the movement of a block of ore from the head of Lake Superior during the coming season at 50 cents, free of the unloading charge, which would mean 72 cents on the basis of last year's charge for unloading, created quite a little stir in lake vessel circles during the past few days. If such a contract was made it was certainly under circumstances other than those that usually prevail when the ore shippers go into the market to make season contracts for vessel capacity and it will have no immediate effect upon the business of the coming season. Ore prices are not established, and not likely to be for a month, and when the ore freight rate is named it will very likely include, except in special cases, such as the Rockefeller-Carnegie contracts, the unloading charge, as nothing has been done to change generally the practice of past seasons in this regard. It is a fact, however, that in talking of lake freights for another year the ore shippers refer to an agreement made some time ago between Rockefeller and Carnegie interests for the transportation of the Stevens mine ore for a period of years, in which the lake freight named was 50 cents, free of the unloading charges. The shippers say that all should have the advantage of this same rate, which would mean about 70 cents, including the unloading charge. Vessel owners claim that in view of the outlook as to costs, there would be no profit whatever in such a rate, excepting for the very largest of the lake carriers, and it is true that wooden vessels would be operating at a loss if they accepted 70 cents, unless a material reduction from last year is made in cost of operation. But on the other hand the argument in favor of low freights from the shippers' standpoint is the fact that the capacity of the lake fleet in the coming season, including vessels tied up in 1900 and the new ships that came out late last year, as well as 3,000,000 tons of new capacity now nearing completion, will be nearly 6,000,000 tons greater than it was last season. It is also true that stocks of ore on Lake Erie docks will be much larger than they were last spring.

Considerable interest is attached to figures dealing with the iron ore output, probable consumption of ore and vessel capacity of the new United States Steel Corporation. On the basis of last year's figures, the requirements of the corporation in iron ore aggregate 12,000,000 gross tons. The mines taken over produced last year something more than 9,000,000 gross tons, and the company's fifty-six ships are capable of moving from Lake Superior, going up light, a little more than 5,500,000 gross tons.

THE MARINE ENGINEERS AND LAKE VESSEL OWNERS.

It is quite evident that the action of the Marine Engineers' Beneficial Association on the great lakes in ordering the few men employed on machinery repairs to quit work and in deciding not to go out on the opening of navigation with the vessels upon which they have been employed, unless demands which they have made upon the owners are given consideration, is the basis of a plea for recognition of their organization by the Lake Carriers' Association, more so than a question of wages or even the matter of more help in the engine room. Geo. Uhler, national president of the engineers, has repeatedly tried to have the Lake Carriers' Association recognize and treat with the organization which he represents. He has been unsuccessful, largely for the reason that since the strike of several years ago, in which the vessel owners were put to very great expense, although the engineers were defeated, there has been no particular love among the vessel owners for the engineers as an organization. What position the vessel owners will now take in the matter of recognizing the organization of engineers or replying in any way to their demands is not known. They certainly seem as yet quite indifferent to the fact that a strike has been ordered. They say that the action of the engineers could not have been taken at a better time as far as the ships are concerned, as the outlook for business is such that delay in opening navigation will be welcomed in the hope that a short season may bring improved freights and better profits at the end of the year.

If the owners are concerned to the extent of doing anything at all towards meeting the strike proposition, their actions do not appear on the surface. It cannot be learned that they have even held a meeting to discuss the matter. Such of them as are inclined to talk at all say that the engineers are not so organized as to enforce any demands beyond the conditions of last year, unless they should be assisted by the men employed on the docks or by the association of tug men. As the workmen on the docks, represented by officers of the International Longshoremen's Union, are now engaged in trying to close up amicably a contract with the dock managers that will bind them to service irrespective of other unions, and as officers of the longshoremen have said that they will not take up the battle of an organization that comes to them only in time of trouble, the vessel owners do not look for a general strike on account of the action of the engineers. In the event of tug men refusing to tow vessels on which non-union labor is employed, it is more than probable that their duties under the United States statutes giving them license as officers of steam vessels will be taken up. The law in this regard was clearly shown in the tug cases of the past season at Duluth, where licenses were in one instance suspended. Another case will be found in one of the decisions of the treasury department numbered 14,205.

This decision related to "combinations of licensed officers of steam vessels to the hindrance of commerce." It will be found on page 617 of decisions of the treasury department for 1893 and is dated July 27, 1893. John G. Carlisle was then secretary of the treasury and the solicitor of the treasury was F. A. Reeve. It was shown that an agreement of a labor union kind had been entered into between the Brotherhood of Upper Mississippi River Pilots and the rapids pilots of Le Claire, Ia. The rapids pilots agreed not to run over the rapids any steamer of any description piloted by any person not a member in good standing of the Brotherhood of Mississippi River Pilots. It was further agreed on the part of the brotherhood that it would pay to the rapids pilot who refused to pilot a steamer not in charge of a member of the brotherhood the sum he

would otherwise have received for the service. The opinion of the solicitor of the department was requested as to whether the agreement did not amount "to the hindrance of commerce," as defined in the law referred to—section 4449 revised United States statutes—and therefore warrant the suspension or revocation of licenses held by persons who were parties to it, without proof of any overt act on their part. The answer of the solicitor, which was given out as the law of the department, was as follows:

"The law has for its object the protection of life and property and should be strictly construed. The parties to the contract in question have bound themselves 'without good and sufficient reasons' in law to disregard the performance of their official duties in a given class of cases. Such an agreement to refuse to serve as pilot, which is in effect a conspiracy, must be considered 'to the hindrance of commerce' within the meaning of section 4449 revised statutes, and for this reason renders the officers who are parties to the same justly liable to suspension or dismissal by revocation of their license, under provision of section 4450 revised statutes, without any further act of 'misconduct' on their part."

A PICTURE OF THE WORLD'S COMMERCE.

A picture of the world's e-commerce in 1900 is presented in some figures just published by the treasury bureau of statistics as a part of the monthly summary of commerce and finance. It shows the imports and exports of twenty of the principal countries of the world down to the latest attainable date, in many cases including the final month of the year 1900. The figures in most cases are for that portion of the fiscal year which had expired at the latest date for which the figures can be obtained, and compare the imports and exports of this latest term in question with the corresponding months of the preceding fiscal year, showing the increase or decrease of imports or exports in each case.

The figures are especially interesting in the opportunity which they offer to compare the present condition of the commerce of the various countries with that of one year ago, and to compare the growth of our own commerce with that of other countries. In the latter opportunity the figures are particularly gratifying. They show that the exports of the United States in the seven months ending with January, 1901, increased just \$100,000,000 over the corresponding months of the preceding fiscal year, while those of the United Kingdom in the same months increased just \$50,000,000 over the corresponding months of the preceding year. Germany's increase in exports for the twelve months ending with December is \$49,000,000 over the year 1899, while France shows a decrease of \$14,000,000 in 1900 as compared with the year 1899. Argentina during the nine months ending with September, 1900, shows an increase of \$5,000,000 in exports over the same months of the preceding year; Austria-Hungary in the calendar year 1900 shows an increase of \$10,000,000 over 1899; Belgium shows a decrease of \$12,000,000 in the calendar year 1900 compared with 1899; Canada for the five months ending with November shows an increase of \$12,000,000; Mexico in the four months ending with October, an increase of \$4,500,000; Russia in the ten months ending with October, an increase of \$38,000,000; British India in the seven months ending with October, a decrease of \$15,000,000; Italy in the eleven months ending with November, a decrease of \$16,000,000, and Spain in the eleven months ending with November, 1900, a decrease of \$6,000,000.

Turning to the import side, the figures also show a satisfactory condition with reference to the United States, as compared with that of the other countries presented. In the seven months ending with January, 1901, the imports into the United States were \$28,000,000 less than those of the same months of the preceding fiscal year, while those of the United Kingdom in that time showed an increase of \$27,000,000; Austria-Hungary shows in the full year 1900 an increase in imports of \$15,000,000; Belgium for the same period, a decrease of \$10,000,000; France in the full year 1900 a decrease of \$22,000,000; Germany in the same period an increase of \$18,000,000; Italy in the eleven months ending with November, an increase of \$10,000,000; Mexico in the four months ending with October an increase of \$2,000,000 over the corresponding months of the preceding year, and Spain in the eleven months ending with November, a decrease of \$5,000,000 as compared with the same months of 1899. For the seven months ending with July, 1900, the Philippine islands show an increase in imports of over \$2,000,000, and in exports of nearly \$6,000,000.

THE NEW SEA & LAKE INSURANCE CO.

Just as New York has its "Rockefeller crowd," "Morgan crowd," etc., so other sections of the country have groups of capitalists that work together in the promotion of enterprises, but not of course along the broad lines that prevail in the metropolis. On the great lakes considerable has been heard lately of what is known as the "ship building crowd," so named for the reason that it includes men in control of the American Ship Building Co.—W. L. Brown of Chicago, A. B. Wolvin of Duluth, James C. Wallace and James H. Hoyt of Cleveland, Edward Smith of Buffalo, W. E. Fitzgerald of Milwaukee, and others. These are names associated with the new Sea & Lake Insurance Co. organized a few days ago with a capital of \$750,000. Geo. L. McCurdy of Chicago, who is well known in marine insurance circles throughout the country, will probably be most prominent, with Edward Smith of Buffalo, in the management of affairs of the company. Capt. D. Sullivan, vessel and insurance agent of Chicago, is also interested. The object of the new company is to be able to take lines of insurance on steel steamers large enough to enable them to control the placing of the balance of the insurance in London. Stockholders of this American company are in all cases either owners of lake vessel property or they are in position to influence the placing of insurance. As yet there is nothing to indicate any difference in either form of policy or rates for insurance of lake vessels during the coming season, but vessel owners are all looking for some reduction, in view of signs of a struggle for the business and in view also of the fact that the insurance companies have had two profitable years.

BRITISH SHIPPING RETURNS.

AN ADDITION OF 1,221,533 TONS GROSS TO THE REGISTER DURING 1900—MORE THAN HALF A MILLION TONS TRANSFERRED TO FOREIGNERS—
INTERESTING REPORTS FROM LLOYD'S.

Lloyd's register of shipping has just issued its statistical tables for 1900. The tables are concise and compact and epitomize the ship building of the United Kingdom very completely. The total addition of steam tonnage during the year has been 1,186,630 tons gross, and of sailing tonnage 34,903 tons gross, or in all 1,221,533 tons gross. About 93.5 per cent. of the tonnage added to the register consists of new vessels practically all built in the United Kingdom. The largest items among the other additions to the register are those of vessels transferred from foreign countries and from British colonies to the United Kingdom. These together amount to 68,056 tons, or not quite 6 per cent. of the total. The gross deduction of steam tonnage from the register amounts to 741,860 tons; and of sailing tonnage to 193,195 tons; or in all to 935,055 tons. About 26 per cent. of the steam tonnage and 38 per cent. of the sailing tonnage, included in these figures, have been removed on account of loss, breaking up and dismantling.

The tonnage transferred to foreigners during 1900 amounts to 596,140 tons. This total is less by 13,449 tons than the similar figures for 1899,

more than 1.3 per cent. of the totals classed in each of the years 1899 and 1900.

Among the vessels classed during the year—besides passenger and cargo vessels of ordinary types—are five steamers to carry oil in bulk; sixteen yachts; 177 steam fishing vessels (principally trawlers); fourteen tugs; coasting vessels, dredgers, barges, etc. The average size of the steamers classed during the past year is about 2,058 tons, and of sailing vessels, about 601 tons. Excluding vessels under 200 tons, in order to avoid the diminution caused by yachts, trawlers, etc., the comparative averages for the past few years stand as follows:

	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.
Steam	2,706	2,807	2,634	2,452	2,555	2,647	2,219	2,356
Sail	1,580	1,612	1,441	1,741	1,826	1,607	1,816	1,684

During 1900, sixty-one steamers of over 5,000 tons each have been classed as compared with fifty-two during 1899, forty-seven during 1898, twenty-four during 1897, thirty-one during 1896, and seventeen during 1895. Of these sixty-one, twelve belong to Germany; four to the United States; two to Japan; one to Austria-Hungary; one to Holland; one to Russia; and the remainder to the United Kingdom. The largest steamers included in the return are the Saxonia, 13,693 tons, Ivernia, 13,800 tons, Potsdam, 12,606 tons, Vaderland, 11,899 tons, and Devonian, 10,418 tons. Four sailing vessels of over 2,000 tons have been classed in 1900. These are the Marthe, 3,255 tons, Nantes, 2,786 tons, Ville de Belfort, 2,034 tons, and Ville de Dijon, 2,025 tons, which have all been built in France.

Of the tonnage classed during the year, 1,151,373 tons, or 87 per cent.,

RELATIVE VOLUME OF EXPORTS AND IMPORTS THROUGH THE PRINCIPAL PORTS OF THE ATLANTIC AND GULF COASTS OF THE UNITED STATES
FOR THE CALENDAR YEAR 1900.

Prepared by Peter Wright & Sons, Philadelphia and New York.

	WHEAT EXPORTS	CORN EXPORTS	OATS EXPORTS	FLOUR EXPORTS	CATTLE EXPORTS	BEEF EXPORTS	BACON & HAM EXPORTS	LARD EXPORTS	PETROLEUM EXPORTS	CO. TON EXPORTS	SUGAR IMPORTS	TOTAL IMPORTS	TOTAL EXPORTS
	BUSHELS	BUSHELS	BUSHELS	BARRELS	HEAD	POUNDS	POUNDS	POUNDS	BARRELS	POUNDS	TONS	DOLLARS	DOLLARS
PORTLAND	4,678,000	1,781,000	2,819,000	297,000	23,000	6,944,000	25,768,000	14,382,000		5,624,000		710,000	9,536,000
BOSTON	11,925,000	13,893,000	4,518,000	1,606,000	113,000	122,837,000	246,247,000	79,658,000	19,000	154,280,000	152,000	68,741,000	123,868,000
NEW YORK	21,935,000	43,646,000	9,505,000	4,507,000	109,000	241,681,000	339,741,000	286,681,000	11,778,000	323,363,000	1,089,000	528,896,000	539,802,000
PHILADELPHIA	5,512,000	33,703,000	6,700,000	2,174,000	28,000	20,343,000	71,606,000	40,422,000	6,824,000	4,428,000	313,000	49,191,000	81,328,000
BALTIMORE	4,530,000	40,535,000	3,973,000	3,004,000	52,000	21,243,000	68,656,000	98,012,000	880,000	102,988,000	3,000	19,688,000	111,462,000
NEWPORT NEWS	1,675,000	8,702,000	2,227,000	2,208,000	26,000	101,000	830,000	30,474,000		20,548,000		3,674,000	33,922,000
NORFOLK	99,000	4,445,000	3,000	412,000	2,000	133,000	1,111,000	6,708,000		11,834,000		346,000	10,554,000
WILMINGTON										126,646,000		138,000	13,434,000
CHARLESTON										98,272,000		1,383,000	9,811,000
SAVANNAH										414,653,000		513,000	49,540,000
PENSACOLA	103,000	534,000	32,000	28,000			441,000	3,101,000		75,352,000		96,000	14,233,000
MOBILE	101,000	1,529,000	153,000	212,000	14,000	1,025,000	8,066,000	9,456,000		60,054,000		2,334,000	14,095,000
NEW ORLEANS	8,060,000	23,403,000	1,569,000	374,000	4,000	697,000	4,494,000	8,794,000		1,014,749,000		19,829,000	143,297,000
GALVESTON	11,188,000	3,073,000		191,000						814,763,000		1,278,000	92,512,000

but it exceeds the total of figures for 1896, 1897 and 1898 (themselves exceptionally high) by 256,865 tons, 208,346 tons and 7,632 tons, respectively. The steam tonnage which has been deducted on this account, amounts to no less than 49,131 tons, and the sailing tonnage to 105,009 tons, or about 66 and 54 per cent., respectively, of the total deductions in each case. In the main, the vessels which are transferred to foreigners are not of very recent construction. Tables which are included in the registrar-general's returns indicate that 38 per cent. of the tonnage removed from the register because of foreign transfer had been built before 1885, and 55 per cent. before 1890. During 1900, Spain has been by far the largest purchaser. That country has acquired from the United Kingdom sixty-seven vessels of 136,866 tons. Germany and Italy have acquired 88,650 tons and 81,667 tons, respectively; while among other principal purchasers, may be mentioned Norway (50,818 tons), Greece (41,514 tons), and France (39,253 tons). In addition, 67,327 tons have been transferred to the British colonies as compared with 21,681 tons in 1899, 37,285 tons in 1898, and 58,743 tons in 1897. It will be understood that new vessels built in the United Kingdom directly for colonial and foreign owners are not included in these returns.

On the whole, during 1900, the steamers on the official register of the United Kingdom have increased by 179 vessels and 444,770 tons, while sailing vessels have decreased by 389 vessels and 158,292 tons. The total number of vessels on the register has therefore decreased by 210, and the total tonnage has increased by 286,478 tons during the year. During 1900, 662 new vessels of 1,320,428 tons have been classed by Lloyd's register. Of these vessels, 633 of 1,303,003 tons are steamers, and 29 of 17,425 tons are sailing vessels. The return shows an increase of 4,959 tons, as compared with the similar figures for 1899, which themselves far surpassed all previous records. Nearly 99 per cent. of the tonnage classed has been built of steel; and 1.0 per cent. of iron. Sailing tonnage, which formed 25 per cent. of the total tonnage classed in 1891, 30 per cent. in 1892, 18 per cent. in 1893, and 6 per cent. in 1897 has formed scarcely

have been built in the United Kingdom. Among foreign countries, Germany, Italy and the United States of America contribute the largest amount of tonnage. The return includes a statement showing the countries for which the vessels have been built. 887,146 tons, or 67 per cent., have been built for the United Kingdom, and 433,282 tons, or 33 per cent., for other countries. Germany leads with 107,483 tons; Austria-Hungary has 75,883 tons; Holland, 45,450 tons; Italy, 33,890 tons; France, 31,005 tons; Spain, 30,828 tons; Russia, 30,634 tons; and the United States of America, 27,284 tons.

Where built.	Steam vessels.		Sail vessels.		Total.	
	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.
United Kingdom	583	1,144,793	20	6,580	603	1,151,373
America, U. S. of	5	27,216	..	..	5	27,216
Austria-Hungary	3	7,508	..	..	3	7,508
Colonies	1	142	..	..	1	142
Denmark	4	10,623	..	..	4	10,623
France	1	4,756	4	10,089	5	14,845
Germany	14	52,590	..	..	14	52,590
Holland	8	10,273	4	688	12	10,961
Italy	9	33,890	..	..	9	890
Japan	3	10,269	1	68	4	10,337
Russia	1	750	..	..	1	750
Sweden	1	193	..	..	1	193
Total	633	1,303,003	29	17,425	662	1,320,428

Note.—Of the steam vessels in the foregoing table only five of 440 gross tons are wood and of the sail vessels only fifteen of 775 tons.

F. H. CLERGUE ON THE STEEL CORPORATION.

Newspaper dispatches are putting everything of a steel manufacturing kind into the United States Steel Corporation. During the past week a story went the rounds that the steel works building at Sault Ste. Marie were to be absorbed by the big combination. Of course, no such thing is contemplated, but Francis H. Clergue of Sault Ste. Marie, who happened to be in Ottawa, was asked what effect such an absorption would have upon his works. He replied:

"There is not the slightest foundation for a rumor of this kind and it is not likely that the government of the Dominion nor of the province of Ontario will permit any of the industries within their territory to be conducted in a manner prejudicial to the interests of Canada or of Great Britain. If the American combination were to acquire ownership of the Sydney plant and of the Sault Ste. Marie plant the new owners will be very sure to find that they would be bound to conduct them, first in the interests of Canada, and next in the interests of Great Britain. This is only common sense and common honesty, and no one could justly complain if the Sault Ste. Marie or Sydney operations were to be prevented by the government from operating to the damage of Canada or Great Britain.

"My own opinion in the matter of American and Canadian trade relations has not been concealed. I am in favor of absolute reciprocity between Canada and the United States in such lines of industry as may not result in serious damage to existing interests. The present situation in steel and iron indicates the measure of opportunity which the United States is rapidly losing. If Great Britain should draw about herself in conjunction with her colonies the tariff cordon which now protects American industries, the supplies of raw materials which would thus be jointly held are sufficient to make Great Britain and her colonies the only successful industrial competitor of the United States on the globe. The only basis upon which the American combination can acquire the Canadian plants will be that they shall carry out the Canadian undertakings as now projected, and such a result would afford Canada the advantages, the hope of which persuaded her to offer the inducements which have resulted in the establishment of these plants. Canada will not bar out American capital so long as its efforts are bent to the improvement of Canadian conditions and Canadian resources. In fact, I think American methods and American capital are just what Canada prefers, but they will be required to exert their energies in good faith to the benefit of the land which receives them.

"The American combination will incite the Canadian manufacturers to greater efforts, and since the announcement of its completed organization the Sault Ste. Marie company has enlarged the scope of its undertakings in the steel industry by adding to its Bessemer plant a rail mill which will be completed in July, and has a capacity of 600 tons daily, six blast furnaces of 400 tons capacity each, and open hearth furnaces of a capacity of 200 tons daily. It is intended to begin work on this enlarged plant early in the coming season. They should commence to come into operation within the next fifteen months, and it is expected the entire plants will be running up to an output of 2,600 tons daily within two years."

BRITISH MERCANTILE MARINE.

Speaking of the annual reappearance of statistics showing Great Britain's aggregate naval expenditure side by side with the aggregate tonnage of the mercantile marine, as well as the value of imports and exports by sea, the Liverpool Journal of Commerce suggests that they serve to point out that year by year Great Britain is paying more for national sea insurance. Premiums, compared with the amount at risk, continue to bear very favorable comparison with those paid by other nations:

MERCANTILE MARINE AND FOREIGN TRADE.

	Mercantile marine.	Foreign and coasting clearances.	Exports and imports.
British Empire	9,707,668	174,731,889	£1,300,339,370
Russia	554,141	a28,280,184	a84,430,000
Germany	1,639,552	17,812,760	b540,082,000
Holland	302,224	9,375,535	c15,008,000
France	957,766	30,446,289	328,768,000
Portugal	129,522	10,279,489	16,808,000
Spain	657,924	24,315,215	63,662,000
Italy	815,162	30,162,879	72,305,000
Austria-Hungary	224,578	14,325,185	24,179,000
United States	848,246	d22,177,483	405,468,000
Japan	648,324	3,770,346	61,887,000

(a) Russia in Europe and Caucasus. (b) Total trade. (c) Metric tons. (d) Exclusive of lake tonnage.

Thus it is seen that Great Britain retains no less than 58 per cent. of the total marine of the eleven leading maritime nations of the world, clearances amounting to 47 per cent. and the value of the goods handled to 44 per cent.

CHANGES IN CONSTRUCTION BUREAU.

Several important changes have been made in the construction department of the navy as a result of the change in the head of that corps by which Naval Constructor Bowles succeeded Chief Constructor Hichborn as head of the bureau of construction and repair with the rank of rear admiral. Naval Constructor Washington L. Capps, on duty in the bureau in Washington, has been assigned to duty at the New York navy yard, taking the place vacated by Admiral Bowles. Constructor R. M. Watt, now on duty at Elizabethport, N. J., has been detailed as Constructor Capps' assistant at New York. Naval Constructor H. G. Smith, who formerly served with Admiral Bowles at the New York navy yard, is ordered to Washington for duty in the bureau of construction and repair. Naval Constructor J. J. Woodward, who was Admiral Hichborn's chief assistant in the bureau, has been assigned to duty as a member of the board of inspection and survey, as the relief of Constructor Capps. It is understood that Naval Constructor D. W. Taylor will continue his present duties in charge of the experimental tank work at the Washington navy yard.

SENATOR FRYE ON THE SHIPPING BILL.

HE SAYS THAT HE HAS BY NO MEANS GIVEN UP THE FIGHT AND WILL RESUME IT AT THE NEXT SESSION.

Senator Frye was asked in Washington last week whether he had given up the fight on the shipping bill.

"I certainly have not," he replied, "and I never will surrender until necessary legislation has been enacted to restore our flag to the oceans of the world. We are magnificent in everything else, but occupy a most wretched and humiliating position in this regard. A vote on the shipping bill at this session was prevented by deliberate filibustering on the part of six or eight of the opposition. It commenced immediately after the bill was made unfinished business. Two or three weeks were spent in discussing the Hay-Pauncefote treaty, two or three more on the army reorganization bill; indeed, time was purposely consumed on every bill, including all the appropriation bills, until within the last few days of the session. This made it absolutely impossible to secure a vote. It did one other thing, somewhat unfortunate. While I had an opportunity to open the discussion on the measure and Senator Hanna to make his speech, when it became evident to its friends that there was a determination to prevent any vote, they could not discuss it, lest their use of the time might assist the opposition. This resulted in misstatements of all kinds in relation to the measure going to the country without any reply. Vituperation on the part of those opposed took the place of argument, and bitter denunciation of statesmanlike debate. I fully intended to close the debate with the answer to all this, but the opportunity was lost. As presiding officer of the senate I could not afford to violate its rules and make a speech on shipping when other measures were under consideration.

"I would like to call attention to a few of the utterly absurd propositions made against the bill and the mistaken statements. Senator Turner in a speech found, by figures which he gave, that the cost the first year, if this bill should become a law, would be over \$11,000,000, a mistake of at least \$5,000,000. In one statement he named vessels aggregating over 155,000 tons, which he said would earn \$1,771,778 subsidy. He admitted that he did not know the speed or trade, yet might have found their speed in the report of the commissioner of navigation for 1900. As matter of fact, the amount these vessels would earn, as shown by what they did in 1899, would be \$154,780. Senator Turner's error was \$1,616,998. He included in this statement three wooden steamboats, drawing about 3 ft. of water, which run from St. Michael up the Yukon river, and yet he had them making voyages from New York to Southampton. He also included all the vessels that run daily between Eastport and St. Johns, between Key West and Havana, between Puget sound and Victoria—practically mere ferries. In another place in his speech he included two steam dredges built to carry on harbor improvements in New York; but the senator, in his figures, proposes for them eight round trips a year between New York and Southampton.

"These are fair samples of many of the statements made and not contradicted at the time for the reasons I have given. Another thing I am reminded of. There seemed to be a desire to make a somewhat furious attack on our American line between New York and Southampton. It was asserted over and over again by several of the speakers that its ships were perfectly useless as carriers of freight, that the subsidy to be paid them was a mere present, when as a matter of fact these four ships last year carried over \$20,000,000 worth of exports from the United States to foreign ports, exclusive of specie and mails. Each one, as shown by the certified manifests of shippers filed in the custom house, carried on each trip abroad \$440,000 and over in value of exports. A slow cargo steamer of practically the same size as either one of these ships could carry 10,000 tons of wheat, which would be worth about \$280,000. So the fast steamers of the American line actually carried on an average last year \$164,000 more in value of exports per voyage than the slow steamers of the same size could possibly have carried had they been fully loaded, while these fast steamers made an average of eleven voyages a year and the slow steamers could not make over seven. The St. Louis, one of these ships, would carry in a year \$4,890,000 worth of freights, while a slow cargo steamer of the same tonnage if fully loaded every voyage with wheat could only carry \$1,960,000 in value. In other words, the fast passenger steamer would in a year carry out of the country nearly two and a half times as much in value of exports as the slow cargo steamer carrying wheat. It is the value of our exports that counts in establishing the balance of trade for or against us.

"Another thing. Seventy-five per cent. of the freight so carried by these fast steamers was farm products, largely in concentrated form, like butter, cheese and other dairy products; also fresh meats, canned fruits and meats and perishable fruits. The export trade in California fruits is largely dependent upon these fast steamers, which alone enable them to reach Europe in marketable condition. While fast ships will carry this class of freights, the lower-powered vessels must carry wheat, corn, coal, etc., at much lower rates. The bill encourages the latter by larger bounties in proportion to the cost of operating. I regret exceedingly that I could not secure an opportunity to reply to the statements made by the opponents of this bill and show their utter falsity. I intend to devote a portion of my vacation to a careful consideration of this subject, and to be prepared very early in the next session of congress to bring to the attention of the committee on commerce a measure which in my judgment will restore our flag to the oceans of the world."

Some of the states bordering on the great lakes have encouraged the registration of vessels in towns that have shipping facilities by making laws favorable to the vessels from the standpoint of taxes. Competition for the vessels has followed acts of this kind. Now it is reported from Lansing, the capital of Michigan, that the senate of the Wolverine state has adopted a concurrent resolution providing for the appointment of a commission of three senators and two representatives to confer with a similar commission from Wisconsin and Minnesota for the purpose of agreeing to a uniform method of taxing vessel property. The author of the resolution is Senator Kelley, who has also introduced in the Michigan legislature a bill providing for a tonnage tax.

DOMINION IRON & STEEL CO.

From the Bulletin of the American Iron and Steel Association

The first furnace of the Dominion Iron & Steel Co. was blown in on Feb. 2 and the first cast of pig iron was made on Feb. 5. The second furnace will be started during the present month, and the schedule date for the third furnace is May 1, and for the fourth June 1. This will make a total capacity of from 1,000 to 1,500 tons of pig iron per day. In October the steel mill will be in operation for the manufacture of billets, and on Jan. 1, 1902, for rails and plates. The \$10,000,000 for the construction of this plant has come from American and Canadian capitalists, and the proprietors of this enterprise figure that it will be one of the great factors of the steel and iron business, as they believe that iron and steel can be made at Sidney cheaper than anywhere else in the world at tidewater.

Mr. A. J. Moxham, the general manager of the Dominion Iron & Steel Co., in a recent address before the Canadian Manufacturers' Association at Toronto, clearly emphasized the unique advantages of Cape Breton in the manufacture of steel. Mr. Moxham further said: "We are now in operation and are making an excellent quality of pig metal out of nothing except our own Wabana ore and Dominion coal. At first we were told that, although Cape Breton coals had coked at Everett, Mass., the coke was unfit for blast furnace use; it would not stand the burden. In answer I would state that the third day after our start it was carrying the full burden; it has done so ever since, and will continue to do so indefinitely. The coal was found to be only slightly more sulphurous than the Connellsville coal, and we further found that the excess could be economically washed out, and so erected a washing plant. The coal washer not being ready, we determined to start without it, and we did so, making our coke out of plain, everyday, unwashed Cape Breton coal. Our flux we knew to be unusually pure, and we felt this was worth something in controlling the sulphur. Our second cast from the furnace put us in control of the sulphur. The fifth cast brought it down to 19-1000ths of 1 per cent. For the most purposes it is too low, not too high. In every other ingredient Cape Breton coal equals, if it does not exceed, Connellsville. In ash the unwashed coal gives us a coke with from 6½ to 7½ per cent. ash, as against 10½ to 11 per cent. in the Connellsville; in fixed carbon from 90¾ to 91 per cent., against 89½ per cent. in the Connellsville."

TRIPLE SCREW WAR SHIPS.

Rear Admiral Geo. W. Melville, engineer in chief of the United States navy, has written a great deal about triple screw war ships. A brief summary of the advantages which he claims for the vessel of three screws is contained in the following paragraph:

"The most evident advantage from the use of three screws is the consequent subdivision of the power. This is of particular moment on war vessels where the possibility of disaster in battle is to be considered as well as that of accident in time of peace. Not only does the increased number of engines decrease the probable amount of power that may be disabled at any time, but the chance of fatal injury to the ship through its motive machinery is also greatly lessened. The danger from a shell is decreased. It would require three shots penetrating the steel deck to completely disable a triple screw ship, as against but two in the case of a vessel fitted with twin engines. This, however, is assuming a possibility which may not be a fact, that a shell will not have any disastrous effect outside of the compartment in which it explodes. It is probable that the vertical bulkhead between the engine rooms cannot be so entirely depended upon as to restrict the effects of an explosion. It is quite possible that a single, very lucky, shot might completely disable a twin screw war vessel. If so, then it would take at least two such shots to inflict corresponding injury on any ship with triple screws. In case of the wrecking of any single engine, the amount of power lost with twin screws would be one-half, as against the much less reduction of one-third in triple screw ships. It may be urged—and with justice—that the engines of men-of-war are already well guarded from shell fire. If it can be shown, however, that the protection can be increased without consequent loss in other directions, it will surely be well worth while to adopt the system affording greater security. In the old days of sailing ships many a battle was won, sometimes against superior force, by the disablement of the sail power of one of the combatants. After the motive force of any fighting ship was gone she was at the mercy of her foe. In our time, when battleships have a fair all-around fire, the likelihood of this is somewhat reduced; but it is still apparent that any ship which is inert upon the sea is far the inferior of her dirigible enemy. Any system which increases the chance of securing and keeping the 'weather gauge' in battle must be good."

INCREASING SIZE OF SHIPS.

A writer in one of the English shipping journals, whose name is not just now at hand, has this to say on the subject of increasing size of ships:

"Increase in the length of ships is not accompanied by any serious difficulties in the way of construction. The worst condition in which a vessel may be placed is usually assumed to be when she is instantaneously poised upon the crest, or in the hollow of a wave of her own length. From the results of observations the height of the wave is generally assumed to be one-twentieth of the length, but as waves increase in length the height decreases relatively. Waves over 600 ft. in length have been observed, but the height in most cases does not approach one-twentieth of the length, and for waves still longer the ratio is still further reduced. From these considerations it may be assumed that vessels over 600 ft. in length are not subjected to such severe stresses as the smaller vessels, and therefore the scantlings might be relatively reduced and a further saving in weight effected. This has been borne out in practice by reducing the depth relatively to the length in the larger vessels. The question of pitching requires consideration in these long vessels, but in general the effects of this are purely local and may be provided for without much difficulty.

"For speed, cargo carrying, and sea-going qualities, therefore, length seems the best dimension to increase, and at present the limit to this is governed by dry dock accommodation. If larger accommodation for cargo and passengers, and higher speeds are required with the present materials of construction and methods of propulsion, then ships will continue to increase in size; but the limit has been very nearly reached. In

the future it is more probable that ship builders and engineers will turn their attention to reduction of weight instead of increase in size. With the adoption of some of the stronger alloys of steel for hulls the use of water tube boilers, when these have passed through their term of probation, and some improved form of engine, such as the steam turbine, any further increase in size of steamships would be rendered almost unnecessary.

CENTRIFUGAL VERSUS STEAM JET BLOWERS.

In an investigation regarding the comparative efficiency of centrifugal fan blowers versus steam jet blowers for the production of boiler draft, Mr. B. R. Healey recently made some experiments upon a standard type of refuse-burning furnace having 25 sq. ft. of grate surface. "In each furnace," so he states in a paper read before the Society of Engineers, London, "the furnace was got to full heat before commencing to record the results and every care was taken to ensure precisely similar conditions for each test. The steam pipes were well covered with hair felt, the steam pressure was kept at 80 lbs. during each trial, and the blast mains and blower outlets were all 9 in. in diameter, which is the minimum for 25-ft. grate.

"The first experiment was with a Korting steam jet blower, the initial nozzle being .25 in. diameter, which gave a pressure of .20 in. water gauge. The second experiment was with a small high-speed engine geared direct to a Sturtevant centrifugal blower, and by using exactly the same weight of steam the pressure was increased to .60 in. In these two experiments the furnace gases passed through a multitubular boiler 10 ft. long and 6 ft. diameter to a stack which was 40 ft. high above the grate. Two other experiments were afterwards made without the boiler, and the furnace gases passed direct to a special chimney 12 ft. high over the furnace, and it was found that with the same blast pressure the incinerating power of the furnace was as nearly as possible the same as before, which indicated the extra duty the stack has to perform when steam generators are used.

"A fifth experiment was made with four Korting steam jet blowers of the same size as the one used in the first experiment. These were fixed to a sole-plate at the top of the chimney, 12 ft. above the furnace, and used as exhausters. The ashpit doors being open, it was found that the indraft at the furnace doors was only .25 in. water gauge. The power of the furnace was considerably less than in the other experiments, although using four times the quantity of steam."

AMERICAN MERCHANT MARINE NEEDS HELP.

Mr. J. Irving Scott of San Francisco, vice president of the Union Iron Works, is now in the east. His purpose is to arrange some of the details for the visit of President McKinley to the Pacific coast in May, when the battleship Ohio is to be launched. No president has been on the Pacific coast since the days of Harrison, and elaborate arrangements are consequently being made for the reception of Mr. McKinley. Discussing the merchant marine of the country, Mr. Scott said:

"Americans pay out millions every year for ocean freights, practically all of which goes into foreign pockets. Of all the freighters clearing from San Francisco I don't suppose that in a year three fly the American flag. The French flag is becoming more numerous on the coast. The French are buying English sailing vessels, which they subsidize. The English are putting money into slow steamers of great carrying capacity and speed of about 10 knots. We never had so much money in this country as we have today. Much of it is lying idle. But capital cannot be induced to go into ships, because it has no chance to compete against the subsidized lines of other countries. I do not say that ultimately subsidies will be necessary. If the millions we expend on freight charges could be transferred at once to our pockets we wouldn't need subsidies, but to start is the rub. Two subsidized Japanese lines sail out of Puget sound. The British lines are subsidized and so are the French sailing vessels. American capital cannot without protection seek to rival such government favorites on the high seas."

ICE CONDITIONS THROUGHOUT THE GREAT LAKES.

Norman B. Conger, inspector and marine agent of the weather bureau at Detroit, is making regular weekly reports of the condition of ice throughout the lake region. Under date of March 12, he says:

"Reports from the several regular and display stations of the weather bureau on the lakes indicate that the ice has been broken up to a considerable extent by high winds of the past week, on all the lakes. On Lake Superior, there appears but little ice over the western end, and it is breaking up about the islands. Considerable ice is reported off Keweenaw point and from Whitefish point, westward as far as can be seen from that point. There has been no material change in the St. Mary's river. The ice remains solid in Green bay, and but little ice is reported along the west shore of Lake Michigan, while on the east shore the high easterly winds of the past week have moved the large field out into the lake. The ice remains firm at the Straits of Mackinaw. There is not as much ice reported in Lake Huron; the ice-bridge is formed at the foot of the lake and extends northward about six miles. The ice is beginning to run out of the extreme lower end of Lake St. Clair, and the Detroit river is open as far down as Sandwich point. The ice in Lake Erie appears to have been broken up by the high wind and there is not as much reported along the shore as was the case last week. The field has probably moved over to the Canadian shore. There has been no material change in the conditions on Lake Ontario.

A branch office has been opened in the Guardian Trust building, Baltimore, by the Sprague Electric Co. of New York. This company now has offices in half a dozen leading cities of the country. The Baltimore office, which will be in touch with southern trade, will be in charge of Mr. W. H. A. Davidson.

A large new warehouse, modern in every way, at Lake and Coe street, Cleveland, has just been completed by the Bourne-Fuller Co. A larger and more complete stock of finished iron and steel will be carried than has been possible heretofore.

APPROPRIATIONS FOR LIGHTS, HARBOR WORK, ETC.

The sundry civil appropriation act, passed during the closing hours of the last congress, contains quite a few items of interest to vessel men, especially on the great lakes. The United States light-house board is authorized to begin the construction of five new tenders and funds are provided for the completion of three others. Of the five new tenders, three are for the great lakes. The inspector of the ninth district, Lake Michigan, is to have a vessel to cost \$115,000 and the engineer of the same district one at the same price. A vessel for the inspector of the tenth district, Lakes Ontario and Erie, is to cost \$120,000. The other items of this kind are: New vessel for inspector of eighth district, \$125,000; new vessel for engineer of eighth district, \$85,000; for completing vessel for inspector of third district, \$62,500; for completing vessel for inspector of thirteenth district, \$20,000; for completing vessel for inspector of sixteenth district, \$30,000; for relief light vessel for Pacific coast, \$90,000. For work upon plans of these vessels the light-house board is authorized to employ three draftsmen at Washington. As already announced, an appropriation of \$4,000 is made for the purpose of relieving vessel owners of the lakes of the expense of maintaining certain private lights during the year beginning July 1 next. There are no other appropriations for lights on the lakes, excepting an item of \$52,500 for the completion of a light and fog signal station to mark the outer end of the main channel entrance to Toledo harbor.

The revenue cutter service is allowed \$82,500 for the completion of a revenue cutter of the first class for the great lakes, which was authorized two years ago, and \$112,500 for the completion of a first-class vessel for the Pacific coast, also authorized two years ago. On the score of a new vessel for St. Mary's river patrol service the bill contains the following item: "For the construction, or purchase, under the direction of the secretary of the treasury, of a vessel to be used and equipped as a revenue cutter of the third class for service on the Saint Mary's river, for the purpose of protecting the revenue and enforcing the rules of navigation on said river, \$37,500; and the total cost of said vessel, either by purchase or under a contract, which is hereby authorized therefor, shall not exceed \$75,000."

Appropriations for river and harbor improvements on the great lakes, made in this bill in accordance with continuing contracts, are: For Detroit river, \$325,000; Calumet harbor, \$255,000; Portage lake waterways across Keweenaw point, \$145,000; Duluth, Minn., and Superior, Wis., \$125,000; Buffalo harbor, \$400,000; Ashtabula harbor, \$2,000.

AROUND THE GREAT LAKES.

A powerful tug that can do outside work as well as harbor towing will be stationed at Marquette during the coming season by the Great Lakes Towing Co.

Capt. David DuBose Gaillard, the newly appointed United States engineer in charge of river and harbor improvements on Lake Superior, has taken up his duties at the Duluth office formerly occupied by Major Clinton B. Sears.

Sales of vessel property: Controlling interest in lumber barge S. W. Drake to John J. Boland of Buffalo; steamer Petoskey from Messrs. Hart of Green Bay to G. P. Cory of Chicago; steamer Saginaw from Alvin Peters of Toledo to C. W. Kotcher of Detroit.

Vessel men in all parts of the lakes were very much surprised to hear of the death of Capt. E. B. McQueen, announced a few days ago from St. Clair, Mich. Capt. McQueen, who had been in the employ of Mr. A. McVittie of Detroit for a long time past—he commanded the steamer Senator since she came out—was regarded as one of the best ship masters of the lakes.

General Passenger Agent W. F. Herman of the Cleveland & Buffalo Transit Co. has issued the company's schedule of rates for the coming season. The rate one way is \$2.50, or \$4.50 for the round trip. A basing rate of \$4 for the round trip may be used on all tourist or excursion business. During July and August, 1901, on account of the Pan-American exposition, the company will run special day trips at \$1.50 each way.

The National Masters & Mates' Association of Canada was organized last week in Toronto. The following officers were elected: President, Capt. James McSherry; first vice president, Capt. Jennings; second vice president, Capt. Phillips; secretary, John D. Murphy, No. 1 Church street, Toronto; treasurer, Capt. Tufford; conductor, Capt. Alex. Martin; tyler, Capt. Henry McSherry; auditors, Capt. G. Molton, Capt. Frank Jackson.

Jacob James Conley, an old lake captain, died recently at the home of his daughter, F. M. Lacey of Elroy, Wis. He quit the lakes twenty-two years ago. He began sailing at the age of seventeen years. His first vessel as master was the schooner Allegan. He also sailed the schooners Mobile, O. V. Brainard and Storm. He was born at Pillar Point, Jefferson county, New York, and was eighty-two years old at the time of his death.

George B. Raser, who was up to a short time ago superintendent of the extensive ore and coal docks of M. A. Hanna & Co. at Ashtabula, died at his home near that port Tuesday. Death was due to apoplexy. Mr. Raser had been in charge of the affairs of M. A. Hanna & Co. at Ashtabula for twenty-six years and under his direction the ore and coal business of the docks which he managed had developed from a few thousand tons each year to more than 1,500,000 tons.

Two wooden lighters, each 100x35x10 ft., will be built by Capt. James Davidson, ship builder of West Bay City, Mich., for Frank Perry of Sault Ste. Marie, Mich. The lighters will be used for carrying coal and pulpwood. Contrary to his usual practice, Capt. Davidson did not undertake the construction of any new vessels for lake service during the past winter. Timber is now accumulating in the West Bay City yard, however, and it is said that he will probably put down shortly the keel of a large tow barge.

Lake Shore and Gilchrist are the names selected for the two large steel freight steamers building at the West Bay City yard of the American Ship Building Co. These two steamers will not be owned by the same company that is to own the six other Gilchrist steamers now building—Mars, Venus, etc. The passenger steamer for Holland-Chicago service that is building at the Craig Works, Toledo, is to be named Ottawa, and a small passenger steamer building at the same yard for the Booth

Packing Co.'s service at the head of Lake Superior will bear the name Argo.

At the annual meeting of the Richelieu & Ontario Navigation Co., held in Montreal recently, it was announced that the sum of \$117,813.93 had been expended in dividends during the year, leaving a surplus of \$11,509.03 in the treasury. The gross receipts were \$901,331.80 and the operating expenses, exclusive of fixed charges, \$23,903.51. It was stated further that the directors have contracted with the Bertram Engine Works of Toronto for another steamer of 340 ft. length with 266 staterooms and the most modern and attractive fittings for the route between Montreal and Quebec, to take the place of the steamer Montreal, which will be used on another route. The new vessel will be ready in 1902.

Another of the new Gilchrist steel steamers, the Mars, was launched at the Wyandotte ship yard of the Detroit Ship Building Co. a few days ago. The launch was a success, the ship going into the water on a very even keel, but with a vengeance. She careened until those clinging to the rail were nearly drenched with water and then plunged across the slip and bumped into the opposite side. The Mars is 346 ft. keel and 366 ft. over all; 48 ft. beam and 28 ft. molded depth. Her boilers will be of the Scotch type, carrying 170 lbs. steam pressure, and her triple expansion engines will be the type suggested by the Detroit Ship Building Co.'s experience in developing powerful machinery to run on economical fuel consumption.

MASTERS AND ENGINEERS OF LAKE VESSELS.

Collins Bay Rafting & Forwarding Co., Wm. Leslie, Mngr., Kingston, Ont.: Steamers—Orion, Capt. Geo. Mackey, Engineer W. H. Cunningham; Saturn, Capt. W. Alanson, Engineer Wm. Calcott; Petrel (wrecking tug), Capt. John P. Angrove, Engineer Joseph Branch. Schooners—Muskoka, Capt. P. Gallagher; Waubashene, Capt. Henry Milligan; Neelon, Capt. John McArthur.

Lake Erie Transportation Co., A. W. Colton, Mgr., Toledo, O.: Steamers—Geo. J. Gould, Capt. W. M. Cottrell, Engineer Geo. A. Butler, S. C. Reynolds, Capt. T. C. Herrick, Engineer James Miller; Russel Sage, Capt. Geo. H. Burnham, Engineer Jos. Kohlbrenner; John C. Gault, Capt. C. H. Lewis, Engineer Jno. C. Busted.

Egan, W. M., Managing Owner, Chicago: Steamers—Philip D. Armour, Capt. F. D. Chamberlin, Engineer Frank Keating; John Plankinton, Capt. L. H. Powell, Engineer James Rossan; R. P. Fitzgerald, Capt. L. E. Boyce, Engineer Fred. Coleman; Wiley M. Egan, Capt. Fred Howe, Engineer Chas. Diem.

Ann Arbor R. R. & S. S. Line, W. F. Bradley, Supt., Durand, Mich.: Steamers—Ann Arbor No. 1, Capt. F. A. Robertson, Engineer —; Ann Arbor No. 2, Capt. H. F. Rydt, Engineer —; Ann Arbor No. 3, Capt. W. P. Robertson, Engineer —.

Arnold Trans. Co., Geo. T. Arnold, Mngr., Mackinac Island, Mich.: Steamers—Chippewa, Capt. Wm. McCarty, Engineer M. Madden; Elva, Capt. W. J. Stewart, Engineer Chas. Bon; New Steamer (not named) Capt. James Mondor, Engineer P. Eustice.

Arnold Line Steamers, Geo. T. Arnold, Mngr., Mackinac Island, Mich.: Steamers—Islander, Capt. John McCarty, Engineer —; Lorain L., Capt. Louis Goodreau, Engineer Wm. Gary.

Boynton, L. R., Mngr., Mackinac Trans. Co., St. Ignace, Mich.: Steamers—Sainte Marie, Capt. L. R. Boynton, Engineer Richard Walsh; St. Ignace, Capt. —, Engineer Jos. Rosseau.

Boynton, L. R., Mngr., Island Trans. Co., St. Ignace, Mich.: Steamers—Algolah, Capt. G. W. Boynton, Engineer Richard McLaughlin; Wau Kon Capt. A. R. Graves, Engineer —.

Langell, Simon, St. Clair, Mich.: Steamers—Oscar T. Flint, Capt. Jos. Kearns, Engineer Mr. Coleman; Alfred Mitchell, Capt. F. H. Danger, Engineer J. P. Merrill.

Cummings, M. J., Oswego, N. Y.: Steamers—C. S. Parnell, Capt. P. J. Griffin, Engineer M. H. Griffin; Monteagle, Capt. Wm. Griffin, Engineer Wm. Brown.

Koch, C. McG., Sandusky, O.: Steamer—Annie Laura, Capt. D. O. Lockhart, Engineer J. Shampaign. Schooner—Fostoria, Capt. J. A. Lockhart.

Beyschlag, Charles, St. Clair, Mich.: Steamer—P. J. Ralph, Capt. Henry Leisk, Engineer W. J. Bolton. Schooner—Harold, Capt. Thos. Leisk.

Smith, L. A., Ecorse, Mich.: Steamer—Porter Chamberlain, Capt. James McLarty, Engineer Jas. Potter. Schooner—H. J. Webb, Capt. A. Mills.

Conlon, J. & T., Thorold, Ont.: Steamer—Erin, Capt. P. Sullivan, Engineer Wm. Milne. Schooner—F. L. Danforth, Capt. T. Sullivan.

Carter, E. D., Erie, Pa.: Steamer—Tampa, Capt. F. D. Welcome, Engineer —. Schooner—Aurora, Capt. E. J. Donaghue.

Myles Transportation Co., Ltd., Niagara Falls, N. Y.: Steamer—Myles, Capt. J. Dix, Engineer C. J. McGorley.

Morley, C. T., Mngr., Marine City, Mich.: Steamer—John J. Hill, Capt. A. R. Beall, Engineer S. O. Durant.

Connelly, John A., Chicago: Steamer—Robert A. Packer, Capt. John A. Connelly, Engineer John Durr.

Potter, Teare & Co., Cleveland: Steamer—Mary A. McGregor, Capt. Henry Brock, Engineer Geo. H. Bowen.

Seither, Frank, Cleveland: Steamer—V. H. Ketchum, Capt. R. W. England, Engineer Emil Mercier.

Smith & Co., Wm., Waukegan, Ill.: Steamer—Alice, Capt. Richard Smith, Engineer Henry Ernst.

Miller, J. B., Toronto, Ont.: Steamer—Seguin, Capt. J. B. Symes, Engineer D. L. Foley.

A neat catalogue is issued by the New York Mallet & Handle Works, 452 East Houston street, New York, manufacturers of carpenters', caulkers', coppersmiths' and boiler makers' mallets and other tools. The catalogue illustrates and describes mallets and mauls of all kinds, ship and house carpenters' handles, hooks, hammers, etc.

CLEVELAND HARBOR PROJECT.

ARGUMENT IN FAVOR OF BREAKWATER EXTENSION—AN INTERESTING SUMMARY OF THE SITUATION BY MR. HARVEY D. GOULDER.

Alike to many of the leading ports on the seaboard as well as on the great lakes, Cleveland has shown considerable disappointment over the failure of the river and harbor bill, especially as it has been charged that differences between Senator Hanna of Ohio and Mr. Burton, member of congress from Cleveland and chairman of the river and harbor committee, were in part responsible for delay that held the bill until the closing hours of the session. The breakwater extension that is sought for Cleveland is a very important project and the commercial interests of the city will again be found fighting for it when another bill is being prepared. Argument in favor of the extension is summarized in a letter written to Washington by Mr. Harvey D. Goulder, while the bill was being considered in the senate. Mr. Goulder said:

"The only way to make a good harbor of refuge at Cleveland is to extend the east breakwater a long ways down. The farther extended the better the protection, and the more it will be used, and the more satisfactory will be its use for that purpose. The breakwater proposed in Col. Jared A. Smith's report (extension to western end of Gordon park), does not seem to me so large either in relative proportions or expense as the breakwater authorized in 1875. This is approximately true as to size, cost and number of vessels; as to the volume and importance of the lake traffic generally; as to the volume and importance of through traffic on Lake Erie; as to volume and importance of traffic with the south shore of Lake Erie in our district. It is true as to the population of Cleveland and its importance as a commercial and manufacturing city.

"At the rate at which ships are multiplying on the lakes, the only regret that I have is that our people did not see far enough ahead at the outset to have originally located the lake arm of the west breakwater fully a quarter of a mile farther out, and also that any reason, engineering or otherwise, should exist for drawing in the east breakwater by the shore deflection at the end of that portion heretofore authorized. Taking into account the size of ships now navigating Lake Erie, I am safe in saying that there is no port or place of shelter on the south shore of Lake Erie between Buffalo and the head of the lake which can be entered with any degree of safety in very severe weather. It is a notorious and not uncommon occurrence for vessels bound up the lake, or even bound to Cleveland, to go under Long point, when with a proper and sufficiently large sheltered harbor at Cleveland they could go on to their destination there, or, if bound through the lake, they might keep on going and not have to stop at all, knowing that they could make a refuge at Cleveland in any weather, should the threatened storm catch them.

"On the other hand, vessels bound to Lorain, Cleveland, Fairport, Ashtabula and Conneaut, in heavy weather, where ours is the lee shore, stop in Pigeon bay, over near Point au Pelee, rather than to come on and make the harbor, and especially where they are going to make their port at any time after dark. In such cases vessels bound to Cleveland could come right on with proper shelter there, and if bound to any one of the other ports from Lorain to Conneaut they could come on across, and if they found the weather too heavy to make their port of destination could run into Cleveland and wait for daylight, or for better weather, just that much nearer their destination. When our port is of this character, roomy and safely accessible in bad weather at night, a great use will be found for it, and as the vessels are so numerous and so large, a great deal of room must be required.

"So far as the benefits to Cleveland are concerned they are incidental but extremely important and much regarded by the people. So far as I can judge, it is quite true that the breakwater will protect and so make useful for wharfing purposes a long stretch of shore. This is done, however, without detracting from the merits of the port for purely non-local navigation purposes. It is no objection to the harbor that it can be made to serve this purpose. Indeed, my firm conviction is that it is perfectly justifiable to build the breakwater for the primary purpose of thereby establishing a commercial port. Mr. Loree of the Pennsylvania Railroad Co. states that his company has no room inside for increasing its business. It has not established a plant under the west breakwater because the dispute over there has been not only with reference to the land in front of the lake, but with reference to streets, etc., on Whisky island, which has raised all sorts of difficulties about approach, and that was why they built on the east side of the river, although they would have much preferred the coal docks on the west side, where the cars when emptied of coal could be reloaded with ore without much switching. They are ready, he says, as soon as the dispute is settled, which seems now near at hand, to go ahead on the west side. Other people are ready to go ahead on the east side according to the best information that can be had. This business, already clamoring to be provided for somewhere, seems to be increasing so fast that I have constantly brought to mind the statement of the late Gen. Poe about the wildest expectations of one year becoming very tame realities the next, so that he some years ago ceased to prophesy what would be the extent of the growth of lake commerce."

FOR LIGHTS ON THE GREAT LAKES.

One item in the sundry civil appropriation bill, passed in the closing days of the last congress, is of special interest to members of the Lake Carriers' Association, as it will relieve them in part of the cost of maintaining private lights. The bill gives the United States light-house board \$4,000 to be applied to this purpose, but as all appropriations in the bill are for the year beginning with July 1 next, the lake vessel owners will be called upon to pay for the lights until that time. The paragraph carrying the \$4,000 appropriation is as follows:

"Maintenance of Lights on Channels of Great Lakes.—To enable the secretary of the treasury, under the supervision of the light-house board, by contract or otherwise, to maintain lights necessary for the safe navigation of those channels in the connecting waterways of the great lakes which have been constructed or artificially improved by the government of the United States, where the same cannot properly be lighted from the American side, \$4,000."

MONTHLY SUMMARY OF NAVAL CONSTRUCTION.

The monthly summary of naval construction, issued by the bureau of construction, shows that reasonable progress is being made upon the various naval vessels. None of the recent awards of battleships and armored cruisers has, as yet, been laid down. The sheathed protected cruisers of the Denver class are progressing very favorably and considerable work is being done upon the submarine boats. Following is the summary:

		Degree of completion, Per cent.	
		Feb. 1.	Mar. 1.
BATTLESHIPS.			
Illinois	Newport News	88	90
Maine	Cramp & Sons	42	44
Missouri	Newport News	23	25
Ohio	Union Iron Works	37	39
No. 13	Newport News		0
No. 14	Moran Bros. Co.		0
No. 15	Bath Iron Works		0
No. 16	Fore River Co.		0
No. 17	Fore River Co.		0
ARMORED CRUISERS.			
No. 4	Cramp & Sons		0
No. 5	Newport News		0
No. 6	Union Iron Works		0
No. 7	Cramp & Sons		0
No. 8	Newport News		0
No. 9	Union Iron Works		0
SHEATHED PROTECTED CRUISERS.			
Denver	Neafie & Levy	38	40
Des Moines	Fore River Engine Co.	15	17
Chattanooga	Lewis Nixon	19	22
Galveston	Wm. R. Trigg Co.	9	15
Tacoma	Union Iron Works	14	17
Cleveland	Bath Iron Works	44	48
MONITORS.			
Arkansas	Newport News	47	47
Nevada	Bath Iron Works	79	82
Florida	Lewis Nixon	59	62
Wyoming	Union Iron Works	68	71
TORPEDO BOAT DESTROYERS.			
Bainbridge	Neafie & Levy	88	90
Barry	Neafie & Levy	86	87
Chauncey	Neafie & Levy	87	88
Dale	Wm. R. Trigg Co.	90	91
Decatur	Wm. R. Trigg Co.	90	92
Hopkins	Harlan & Hollingsworth	70	71
Hull	Harlan & Hollingsworth	69	69
Lawrence	Fore River Engine Co.	99	99
MacDonough	Fore River Engine Co.	98	98
Paul Jones	Union Iron Works	82	85
Perry	Union Iron Works	89	93
Preble	Union Iron Works	82	85
Stewart	Gas Engine & Power Co.	47	50
Truxton	Maryland Steel Co.	54	58
Whipple	Maryland Steel Co.	53	57
Worden	Maryland Steel Co.	53	57
TORPEDO BOATS.			
Stringham	Harlan & Hollingsworth	98	98
Goldsborough	Wolff & Zwicker	99	99
Bailey	Gas Engine & Power Co.	99	99
Bagley	Bath Iron Works	98	98
Barney	Bath Iron Works	99	99
Biddle	Bath Iron Works	97	98
Blakely	Geo. Lawley & Son	98	98
DeLong	Geo. Lawley & Son	98	98
Nicholson	Lewis Nixon	84	85
O'Brien	Lewis Nixon	88	89
Shubrick	Wm. R. Trigg Co.	97	97
Stockton	Wm. R. Trigg Co.	99	99
Thornton	Wm. R. Trigg Co.	95	96
Tingey	Columbian Iron Works	67	68
Wilkes	Gas Engine & Power Co.	75	77
SUBMARINE TORPEDO BOATS.			
Plunger	Lewis Nixon	5	5
Adder	Lewis Nixon	27	30
Grampus	Union Iron Works	6	10
Moccasin	Lewis Nixon	18	24
Pike	Union Iron Works	5	9
Porpoise	Lewis Nixon	15	18
Shark	Lewis Nixon	12	16

DISTRIBUTION OF WAR SHIP CONTRACTS.

Secretary Long last week made the distribution among builders of battleships, armored cruisers and protected cruisers, for the construction of which contracts were lately awarded. The distribution was made as nearly as possible on geographical lines, contractors getting the ships named after states or cities in their vicinity. Of the battleships the Virginia will be built by the Newport News Ship Building & Dry Dock Co., the Nebraska by the Moran Brothers' Co. of Seattle, Wash.; the Georgia by the Bath Iron Works of Bath, Me.; the New Jersey and the Rhode Island by the Fore River Ship & Engine Co. of Weymouth, Mass.

Of the armored cruisers the Pennsylvania and the Colorado will be built by Cramp & Sons of Philadelphia, the West Virginia and Maryland by the Newport News company and the California and South Dakota by the Union Iron Works of San Francisco.

Of the protected cruisers the St. Louis will be built by Neafie & Levy of Philadelphia and the Charleston by the Newport News company. New bids will be asked for the third protected cruiser, the Milwaukee. The secretary of the navy received a telegram from the Bath Iron Works of Bath, Me., saying that the company was unable to accept under the conditions imposed the navy department's tender of a contract for building the protected cruiser Milwaukee. Secretary Long directed that an advertisement for new bids be published immediately. The bids will be opened at the navy department at noon on April 4.

The United States civil service commission announces that on April 23, 1901, an examination will be held in any city in the United States where postal free delivery has been established for the positions of inspector of boilers and assistant inspector of hulls and boilers in the steamboat inspection service. From the eligibles an inspector of boilers at Nashville, Tenn., at a salary of \$1,200 per annum, a similar position at Dubuque, Ia., at \$1,500 per annum, and an assistant inspector of hulls and assistant inspector of boilers at Seattle, Wash., will be appointed.

DEVELOPMENT OF WIRELESS TELEGRAPHY.

EMILE GUARINI ESTIMATES THAT IT WILL REQUIRE EIGHTY STATIONS TO TRANSMIT A MESSAGE COMPLETELY AROUND THE WORLD—
WHAT THE EXPERTS ARE DOING.

Marconi, the foremost scientist in the field of wireless telegraphy, which has wonderful nautical significance, has just arrived in the United States for a month's stay from England. He says that he has developed his system to such an extent that he can now transmit messages a distance of 200 miles. He is mute upon the subject of telegraphing across the ocean without wires and says that Tesla has the floor upon that subject at present. Emile Guarini, the inventor of the automatic repeater, has just furnished the American consul at Brussels with a detailed history of advances and experiments in wireless telegraphy to date. While it is impossible for the Review to give all of it, the substance is given below. After a brief introduction dealing with the lurid newspaper accounts of wireless telegraphy, he says:

THE BIRTH OF WIRELESS TELEGRAPHY.

"The trials of wireless telegraphy are not new. Mr. Preece, the chief engineer of the English telegraph office, made experiments in 1892 and 1894 in wireless telegraphy, utilizing what electricians call 'induction effects.' There is also some reason to believe that the first experiments of wireless telegraphy date from 1876. The system at present most popular employs electro-magnetic oscillations of ether. This invisible medium, according to scientists, penetrates all bodies, the oscillations being only distinguished from luminous rays as quantitative, the electric rays being in reality many millions of times longer than the luminous rays. As the luminous rays streaming from a candle or from an electric lamp are equally divided in space, electric invisible rays spring from one electric spark, spreading into space in all directions. Technicians have proved that the discharge of an electric spark, such as lightning, is effected in oscillating movements—as the string of a violin which has just been strummed on vibrates successively until in complete repose. And as the string transmits to the surrounding air oscillating vibratory movements which we find in sound, the ether is transformed in undulating movements by the electric spark. We cannot perceive these movements, but that which human organs can perceive is what a very simple little apparatus called 'coherer' or 'radioconductor' can do. This small apparatus is in general not formed of anything but a little glass tube containing metallic powder and terminating on each side in a good conducting electric wire. This coherer opposes a considerable resistance to the electric current. In other terms, the space between the two conductors occupied by the file dust must be considered as an interrupter. But this resistance is reduced to a minimum as soon as an electro-magnetic ray, spreading from an electric spark producer, reaches the tube; in other terms, the electric contact is established. Thus, without going farther, the possibility of regular telegraphy is admitted; for, as soon as the electric resistance of the coherer is lessened under the influence of electric rays, a local electric current, namely, galvanic, may run through the coherer, become sensitive, and cause a Morse apparatus to play. By very light blows on the coherer, a strong primitive resistance is established.

"Here it is interesting to remark that there is no sort of connection between the energy put into liberty by the electric spark and the one that causes the Morse apparatus to play. The energy emitted by the spark and that influences the tube of file dust only serves as projector; it fills the same role as the mechanic's hand that opens a tap and puts a powerful machine into motion. And for the same reason that it is not the mechanic who furnished the necessary power to put the machine into motion, so it is true that the Morse apparatus is not put into action by the transmitted ray of the spark producer, but by the current of a galvanic local battery. This remark is indispensable: If one day the problem of wireless telephony is solved and the transmission of wireless electric motor power, heat, and lighting attained, it cannot be said that it had as basis or principle the present system of telegraphy. Truly the idea would be that the electric ray acts from a distance without the help of any local battery and without coherer the Morse apparatus. But, unfortunately, we have not yet advanced so far; certainly if that could be, the apparatuses would be greatly simplified, and wireless telegraphy would enter a new stage. Mr. Calzecchi Onesti, an Italian, discovered in 1885 the value of metallic filings, but it was a Frenchman—Mr. Branly, professor of the Catholic Institute of Paris—who constructed in 1890 the first powerful tube of file dust which he called 'radioconductor.' Dr. Lodge, an Englishman, was the first to explain the advantages to be drawn from the tubes of file dust as indicators of electric rays. The contrivance of Mr. Lodge was employed by the author to repeat the experiments of Hertz. The first practical application was realized by Mr. Popoff, professor at the naval college at Cronstadt.

ELECTRIC RAYS FOR TRANSMISSION OF SIGNALS.

"The idea of utilizing the power of electric rays for the transmission of signals seems to belong to the English scientist, Dr. Lodge, who, in a conference which took place in 1894, expressed the idea that the presence of electric rays might be discovered by means of the Branly tube up to a distance of half a mile from their starting point. But no experiments were made to verify the fact. In 1895 and 1896, Mr. Popoff used his contrivance in trials of communications by wireless telegraphy. About the same time another Russian—Mr. Naskevitch Iodko—made independently of Mr. Popoff analogous experiments. In 1896 Mr. Marconi undertook, in his turn, essays or telegraphic communication by 'hertzienne' rays. The measures he took at that time, analogous to the course adopted by Popoff, are actually the same as those now employed. But important improvements in details have been steadily made in the Popoff contrivance by the young Italian. Some of these are but imperfectly known, but it is certain that these have allowed the inventor to obtain results far superior to those already obtained by all other experimenters. He has been assisted in this by a very important English company—Wireless Telegraph Co.—the owner of his patents.

"In France the 'Ducretet' measure is applied by M. Tissot. In America the navy department is studying a special type of apparatus, so as not to accept the caudine forks of the English company. In Austria experiments are made under the Schaeffer system, and it appears that the

North German Lloyd Steamship Co. has established a station for wireless telegraph communication between Bremorhofer, a light-house situated at Borkum, and a light-ship. In Russia the Popoff system is used. In Germany the system officially adopted by the imperial navy is the Slaby-Arco, constructed by the L'Allgemeine Electricitäts Gesellschaft.

"Of the foregoing systems the most perfected, complete and at the same time the most complicated and costly is without doubt the Marconi system. The English admiralty has decided to adopt it and will pay about 38,000 francs (\$7,334) per apparatus—that is, 2,500 francs (\$482.50) per year per apparatus for a period of fifteen years."

DISTANCE OBTAINED ON LAND AND SEA.

By sea the maximum transmission obtained by Marconi was 32 miles in 1899. It appears that in recent trials 84 miles have been obtained at sea and, if Marconi's hopes are realized, this distance can still be increased by sea and on level land. In fact, on land, except by the use of captive balloons or kites, not more than 9 miles distance has been obtained at Berlin with the Slaby-Arco system. Nature offers an impassable barrier to the transmission of messages from one station around the world. However great may be the power brought to bear at the transmission station, inevitable loss of strength occurs on the run of the "hertzienne" rays, which reach the receiver considerably weakened. These losses are notably the production of heat on the ray's passage through more or less resisting bodies in their successive deviations and reflections on metallic substances. The rays themselves are a notable cause of weakness in the power. The height of the anyenne, increased by the distance to be cleared, also the practical question of construction and financial interest, will soon oppose any increase of distance. As sequel to these losses the hertzienne rays fade away at a certain distance from the production station. Then the world is round and the rays spread in a straight line. The skein of concentrated rays must be bent at the curving of the earth by deviations or successive reflections, and thus the losing game will begin again. It is thus necessary to have recourse to other means to solve the problem of wireless telegraphy at all distances. The ordinary electric telegraph gives us the principle of it in relays or translators. The translator or repeater must be able to receive the electric radiations coming from a station or relay post, to give fresh impetus to these radiations and to propel them to an extreme station or another relay post.

It would require eighty intermediate posts to telegraph around the world, according to Mr. Guarini's calculations, and it would be necessary in order to economize time to invent an apparatus that would repeat the telegram at the same time that it receives it.

A CHALLENGE FROM THE COLONIES.

The formation of the United States Steel Corporation has thoroughly aroused the technical press of Great Britain and the British empire, and with characteristic energy they resent the imputation that the empire is in its industrial decline. The Canadian Engineer is particularly spirited, and after insisting that if the strength has departed from the body it is still in the limbs; i. e., if not in the parent then in the colonies, it says:

"Look for a moment at the facilities Canada possesses in ship building. In Nova Scotia and Cape Breton we have a province situated geographically better than any of the sea coast divisions of the United States, to compete with the trade between the western hemisphere and Europe, while as for the industry of ship building itself, its position is unique. No other country in the world, not even excepting Great Britain itself, has such a combination of limitless stores of coal, iron, limestone, timber and other raw materials for ship building, all placed together by nature within the easiest access to the sea, and what is more to the purpose, no other country has such a remarkable coast line as this province, where all inhabitants may become familiar with the great element whose control forms the key of future power. There is not a single county in the whole of Nova Scotia and Cape Breton which has not the sea for one or more of its boundaries, while New Brunswick is scarcely less favorably situated today for the upbuilding of maritime strength. After the middle of the last century, before wooden ship building had declined, Canada was the third power in the world in its tonnage of commercial shipping, but in the interval between the age of wooden ships and that of iron and steel vessels we have simply failed to realize the strength that is in us. Now, however, we have begun to wake up, and it will be but a few years before the Canadian maritime provinces will be building steel ships to greater advantage than any country in Europe or America, while on the Pacific coast the situation of British Columbia and Vancouver island are equally marked out by nature for the same prominence when compared to American Pacific states, which our maritime provinces hold over the Atlantic states, only the development of this industry on the Pacific may be deferred for a number of years. The development of the inland resources of Canada, which will be brought about by railway construction and improved navigation of our lakes and rivers, is just as certain as that of our two sea coasts, while to north, towards Hudson bay, 'the first low wash' of that tide of industrial activity is beginning and will roll on to an extent which cannot yet be estimated. Apart from the resources of Canada in minerals and in forest and agricultural wealth, the colossal chain of water powers are a source of industrial strength to which no land in the world can show a parallel. These powers are every year becoming better appreciated as an element of strength in the industry of this century, and the progress of electricity will raise the value of this great source of power still more in the near future. Taking these various elements of industrial power into consideration and recognizing the fact that Canada is heart and soul a part of the British empire, it is rash to predict that the United States is destined to eclipse Great Britain in the strenuous years to be."

The Bath Iron Works, Bath, Me., has finally declined to accept the contract for the construction of one of the three protected cruisers. The company offered to build this ship for \$2,750,000 and the navy department awarded the contract to it. But it was found that the bidders had eliminated certain equipment and structural features. The same was true of the bids of the Neafie & Levy and Newport News companies, but these two firms yielded to the department's request. The Bath company, however, felt that there would be no profit in the restoration and declined the contract. The navy department will immediately readvertise.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

Published every Thursday at No. 418-19 Perry-Payne building, Cleveland, Ohio, by THE MARINE REVIEW PUBLISHING CO.

SUBSCRIPTION—\$3.00 per year in advance; foreign, including postage, \$4.50, or 19 shillings. Single copies 10 cents each. Convenient binders sent, post paid, \$1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

The navy department has just published a general order giving a list of vessels in the order of proficiency in coaling drill, which marks the first step in an important movement to keep the American navy ahead of all rivals in practical efficiency. About a year ago, recognizing that coal was as much an essential factor of sea power as guns, armor, speed, or numbers of ships, the department, upon the recommendation of Admiral Bradford, directed that the commander of each ship in commission at stated intervals should send in reports of coaling performance. Following is the order of proficiency:

First, Scorpion; second, Michigan; third, Iowa; fourth, Amphitrite; fifth, Kentucky; sixth, Alabama; seventh, Wilmington; eighth, Chicago; ninth, Isla de Luzon; tenth, Hartford; eleventh, Ranger; twelfth, Kearsarge; thirteenth, Massachusetts; fourteenth, Marietta; fifteenth, Texas; sixteenth, Indiana; seventeenth, New York; eighteenth, Montgomery; nineteenth, Bennington; twentieth, New Orleans; twenty-first, Bancroft; twenty-second, Buffalo; twenty-third, Dixie; twenty-fourth, Wheeling; twenty-fifth, Philadelphia; twenty-sixth, Brooklyn.

According to the general order, "it is not deemed expedient to publish the tons of coal per hour taken on board the respective vessels," but it is declared that in most of the ships a vast improvement has resulted, the drills have led to valuable suggestions for the adoption of better methods and appliances, and that incalculable benefits promise to accrue to the service.

And so our old friend Turkey is again in great trouble in its constitutional opposition to the payment of debts. Rear Admiral Frederick Rodgers has been ordered to proceed to the sublime porte with the cruiser New York to enforce the payment of claims of American missionaries in Armenia against the Turkish government. It will be remembered that the call of the Kentucky at Smyrna resulted in the signing of a contract between the Cramps and the Turkish government for a cruiser at such a figure as to cover also the American indemnity. This money has not been forthcoming. There was a report, indeed, that the Cramps had suspended work upon the cruiser owing to failure of the Turkish government to make the initial payment. Whether this is true or not is not known, but at any rate no money has been transmitted to Washington to reimburse the American claimants.

A steel screw steamer specially designed for the carriage of coal between Louisburg, Nova Scotia, and Boston, was launched recently by C. S. Swan & Hunter of Wallsend-on-Tyne and named Mira. She will be owned by the English & American Steamship Co., for which C. T. Bowring & Co. of London and Liverpool are managers. Dimensions are: Length over all, 359 ft.; breadth, extreme, 46 ft.; depth, molded, 30 ft. 1 in. Engines are triple expansion with cylinders of 23½, 39 and 66 in. diameter by 48 in. stroke, steam being generated in two single-ended boilers 16 ft. 6 in. in diameter by 10 ft. 5 in. long, working at 180 lbs. pressure.

Another large cargo and live cattle steamer for the Philadelphia-London service of the Norfolk & North American Steam Shipping Co. has just been completed at the works of J. L. Thompson & Sons, Sunderland, Eng. East Point is the name of the new ship. She is the sixth built by Thompson & Sons for the same owners. Dimensions and other particulars of the vessel: Length, 450 ft.; beam, 51½ ft.; depth, 31 ft.; cargo capacity, 7,750 tons; measurement, 10,000 tons; triple expansion engines and Scotch boilers with Howden hot draft. In the 'tween decks there is accommodation for 350 beasts.

Andrew Carnegie in setting aside \$5,000,000 of Carnegie bonds to provide for faithful workmen in old age has done a noble thing. His two letters, just published—one to his workmen and the other to the people of Pittsburgh—are reflections of the man's inner consciousness. The Carnegie company has always been generous to its partners and workmen and this is a particularly forceful incident of it.

Officers of the Lake Superior Mining Institute, elected at the annual meeting at Houghton, Mich., a few days ago, are: President W. J. Olcott of Duluth, who is in charge of Rockefeller mines; vice-president, Wm. Kelley of Vulcan, Mich.; secretary, A. J. Youngbluth of Ishpeming; treasurer, Geo. H. Abeel, Hurley, Wis.

The Vickers-Maxim Co. has declared a dividend of 20 per cent. The directors recommend an increase in the ordinary share capital to £2,200,000 and the issue of 200,000 new shares to the stockholders.

ANCIENT MINERS OF LAKE SUPERIOR.

A RACE WHICH ANTEDATES THE MEMORY OF THE INDIANS ONCE LIVED THERE—TRACES OF THEIR WORKINGS—WERE FAMILIAR WITH THE COPPER DEPOSITS.

It is generally known that a race of which the Indians have no record, and even no tradition, existed in the upper Michigan peninsula long years before Columbus discovered the continent. Ample evidence of the existence of this race is to be found in the copper mines of Michigan, or rather was to be found in the copper mines of Michigan. When the first discoveries of copper were made in the early forties pits were found of which even the props had decayed and out of the thrown up earth of which trees had grown to their full height and had withered and died, their places to be taken by still other trees, showing that the original workings were centuries upon centuries old. Stone hammers were also found about the pits—the primitive instruments wherewith man first armed himself and wherein is to be found the first evidence of that intelligence which distinguished him from the animal creation. Mr. J. H. Lathrop of the Calumet & Hecla Co. has contributed to the Northwest Magazine an article upon the evidences of mound building in the Michigan peninsula which is of more than ordinary interest. In part he says:

The first information given to the civilized world of the existence of copper on the shores of Lake Superior was contained in a book published at Paris by one Lagarde, in 1636, in which he says, speaking of the Lake Superior country: "There are mines of copper which might be made profitable if there were inhabitants and workmen who would labor faithfully. That would be done if colonies were established." His information concerning the existence of copper in this region was derived from the Indians then inhabiting the country. Pierre Boucher, in his book published in 1640, also at Paris, states: "There are mines of copper, tin, antimony and lead. In Lake Superior there is a great island, which is 50 leagues in circuit, in which there is a very beautiful mine of copper; it is found, also, in various places in large pieces, all refined." The "beautiful mine of copper" referred to by this writer undoubtedly was the ancient workings reopened by the Minong company in 1874, and referred to more fully later in this article. It is not improbable that the exodus of the ancient miners at that time may have been so recent that the masses of native copper, later taken out by the Minong company from the ancient pits, were then fully exposed. If their work on Isle Royale was so plainly defined more than 230 years later, it is not unreasonable to suppose that, at the time Boucher speaks of, these openings were more like a recently opened mine than of one long since abandoned.

VISIT OF THE JESUITS.

From 1660 to 1665, and later, the Jesuits made several visits to Lake Superior, establishing missions at various points; and the memories of Fathers Allouez and Mesnard have been perpetuated in those mines of Houghton county which were named for them. The Jesuits were keen observers, not only for the spiritual welfare of their charges, but also of the geography of the country and its minerals, and their writings gave further information as to the deposits of copper along the shores of the lake. De Charlevoix visited Lake Superior in the course of his extensive explorations, and wrote intelligently and with truth concerning the native copper which he saw along the shore and in the hands of the Indians, who, however, made no practical use of the metal, but hoarded it, regarding the nuggets with superstitious reverence. In 1765 Capt. Jonathan Carver says he discovered "mines of virgin copper which was as fine as that found in any other country," and also that the Ontonagon river is "remarkable for the abundance of virgin copper that is found on and near its banks." A few years later, on returning to England, Carver formed a company in London to work the proposed mine in Ontonagon. In 1771 a party of miners came over from England to establish the mine, but their efforts were fruitless, owing to wrong methods adopted in their mining.

The preceding account is all a matter of history; but centuries ago, even long before the discovery of America, it may be—for archaeologists differ in their opinions—the Lake Superior district was extensively and systematically mined for copper by that strange prehistoric race whom we know by the general term of "Mound Builders," or, as more commonly called in the copper country, "the Ancient Miners." No one living can determine positively who they were, where they came from, or where they went after leaving their homes. From the immense number of these mounds and earthworks extending through the country practically from the western part of the state of New York to the Mississippi river, it is evident that for many years prior to the discovery of America the central part of the United States was populated by a prosperous people far advanced in civilization beyond the savage Indian tribes who were in possession of the country when the white people first landed on our shores. During the years 1820 to 1840, many of these mounds in the west were cut through or carted away in the progress of civilization, and many stone and copper implements were found therein. Copper at that time had not been discovered in the west, and many were the surmises as to where the Mound Builders had obtained it to make their articles of ornament or for use. It was not until the prospectors for copper in the Lake Superior country began their labors from 1843-'46, that the question was satisfactorily solved; and, by some strange intuition, these ancient miners seemed to know just where to look for copper. They made few mistakes, for in almost every instance where the successful mines of the present day are located, were originally works, more or less extensive, of the prehistoric race. This fact has been quoted to show that those strange people had some mysterious intuition by which they were able to discover mineral veins. It is far more probable to assume that their explorations were conducted at a time before the action of the elements had disintegrated the surface of the rocks, thus leaving the mineral veins more exposed to view.

TRACES OF THE ANCIENT MINERS.

The traces which the ancient miners have left of their work in the Lake Superior copper country indicate that they were a most industrious and intelligent race, and that their manual labors must have extended through centuries of time, as they cover an area in Michigan, known as the trap range, having a length of nearly 100 miles through Keweenaw, Houghton and Ontonagon counties, and with a width varying from two to seven miles. Their works were also very extensive on the island in

Lake Superior, some 40 miles from the Michigan shore, known as Isle Royale. This island is about 40 miles in length, by an average of 5 miles in width. The ancient miners cared nothing for the stamp copper, which was useless to them; so their attention was paid to the small masses and barrel work. The fissure veins, carrying mostly heavy copper, were the objects of their research. From examination of their ancient pits we can get a fair idea of their methods of mining, which are crude and primitive to our eyes, but which show wonderful perseverance on their part. The process was to heat the rock carrying the embedded copper by building fires along the outcrop of the vein, and then, removing the coals, to dash water on the heated rock, thus cracking it, and afterwards taking out the broken pieces of rock; then, by breaking away the remaining rock with stone hammers, they released the copper. This method is shown plainly in all the ancient workings by the presence of quantities of charcoal and of stone hammers. In some places remains of birch bark baskets have been found. These were used to carry water to the fires, or the pieces of copper to the boats. It is assumed that the ancient miners had no knowledge of raising water otherwise than by hand, for the pits have only been sunk to a depth where water could be baled out of the pits with comparative ease by sets of men. All along the trap range the vestiges of ancient mining works are very numerous.

The earliest record in detail of the work of the ancient miners was the discovery in 1846 by the prospector, Albert Hughes, on the Minnesota mine location in Ontonagon county, and thus described by Samuel O. Knapp, then agent of the Minnesota mine: "When he had penetrated to a depth of 18 ft. he came to a mass of native copper 10 ft. long, 3 ft. wide, nearly 2 ft. thick and weighing over six tons. On digging around the mass it was found to rest on billets of oak, supported on sleepers of the same material. The wood, from its long exposure to moisture, was dark-colored and had lost its consistency. It opposed no more resistance to a knife blade than so much peat. The earth was so firmly packed as to support the mass of copper. The ancient miners had evidently raised it about 5 ft. and then abandoned the work as too laborious. The number of ancient hammers he took from this and other excavations exceeded ten cartloads. They were made of greenstone or porphyry boulders." From further explorations in this pit it appeared that the original work was about 30 ft. in depth. On the debris outside the mouth of the pit were trees showing 395 rings of annual growth. A large mass of float copper was found in the woods on the land of the Mesnard Mining Co., located to the northeast of the Franklin mine. This mass had been worked at by the ancient miners, as much charcoal was found around it, and the top and sides had been beaten smooth by stone hammers, the marks of which were plainly visible. All projections, and every particle of copper which could be beaten off, had been carried away. The ancient miners must have felt much regret at having to abandon such a treasure. This mass weighed about eighteen tons, and was cut up under direction of Mr. Jacob Houghton, agent of the Mesnard company.

The most extensive series of continuous workings as yet discovered were those found on Isle Royale, on what is known as the Minong belt. Here, for a distance of about $1\frac{3}{4}$ miles in length and for an average width of nearly 400 ft., successive pits indicate the mining out of the belt of solid rock to a depth of from 12 to 30 ft. Between the rows of pits are ridges of rock and soil, taken from successive pits, and indicating that they were left as dams to prevent the passage of water from one pit to another while the latter was being wrought. In another place a drain 60 ft. long had been dug and covered with timbers, felled and laid across. In one place the vein had been followed on an incline to a depth of more than 30 ft. and some 30 in. in width, with large boulders rolled in and wedged to keep the rock above from falling in on the miners, thus taking the place of timbering, as in our modern mines.

ANTIQUITY OF THE WORKINGS.

From the extent of these workings on Isle Royale it would seem that a large number of men must have been employed for a long series of years, and as Lake Superior is a treacherous sheet of water, the crossing of the intervening 40 miles between Isle Royale and Michigan must have been risky work for small boats or canoes. Nothing has ever been found on either Isle Royale or in the Lake Superior region to indicate that the ancient miners were permanent dwellers in the copper country. The climate is severe, and the best protection has to be given to the people at the mines. When one considers the length of time which had to be taken in making the long journey from even southern Michigan to the copper region, unless the seasons were very different in those ancient days than at the present, it is safe to infer that the actual mining in the Lake Superior country, and particularly on Isle Royale, could not have exceeded three months in the year. A peculiarity of the immense numbers of stone hammers which were found in and about the Isle Royale workings, and which has often been commented upon, was the absence of a groove around the stone. This groove was for the purpose of bending a piece of flexible wood around it and then holding it firmly in place by thongs of deerskin, thus providing a handle which could be reinforced by stiffer pieces of wood. The stone hammers found on the mainland of Michigan almost invariably have the grooves. In some explorations made during the summer of 1899 on the Ontonagon range, one of these hammers was found with a part of the handle still intact, held in place by the thongs of skin. It may be that the miners at Isle Royale found the stones on the beaches so well shaped by nature and the attrition of the waves that they made excellent hammers just as they were picked up, so that no time was taken to fit them with handles. On the mainland, near the Ontonagon river, there was found quite an area of ground strewn with stone chips and broken and discarded pieces of porphyry, showing that at some time in the distant past it had been a sort of workshop for the purpose of preparing the stone hammers and other implements for transportation inland.

ARROW HEADS, CHISELS, AXES AND WEDGES FOUND.

The articles and tools into which the pieces of native copper were made were arrow heads, bracelets, awls, needles, knives, spears, chisels, wedges, fleshers, axes and various other things. These articles are found in the mounds scattered from Lower Michigan to Central America, and from Pennsylvania to Arizona, but the greatest numbers have been found buried in the works of the Mound Builders throughout Wisconsin, lower Michigan, Ohio, Indiana, Illinois, Iowa, Kentucky and Tennessee. That the copper from which these tools were made came from the Lake Superior district there is not a question of doubt, though the tools and im-

plements were scattered over a vast area of country. Copper ore exists in vast deposits over Arizona, New Mexico and Central America, but nothing has ever been discovered which would lead anyone to imagine that the ancient miners were sufficiently skilled in metallurgy as to be able to reduce the ores to refined copper. In all the relics of the Mound Builders there is no evidence of any vessels which would indicate that they had ever been used for crucibles, nor is there any evidence of furnaces.

How these strange people came to the Lake Superior region can only be a matter of inference, but from the traces they have left there is but little question that their migrations were made by water. Traces of their storage pits have been found along the shore of St. Mary's river below the Sault. Another series of storage pits was along the north shore of Portage lake, just below the town of Hancock, and these were doubtless used to store the copper taken from along the range now occupied by the Quincy and Franklin mines. That the pits along Portage lake were used for the storage of copper there is no doubt for the native rock at this place is a sandstone, carrying no copper. The storage pits on the St. Mary's river were used for the same purpose, for there is no native copper in that vicinity. On the other side of the river, in Canada, many exploration pits of the ancient miners have been found, but no extended workings; for the Canadian copper is in the form of copper ore, and there is no evidence that it was ever worked. It would seem as though many canoes or boats must have been employed during the summer months in conveying copper from the Lake Superior storage pits to the Sault, thence to be transported either to the south shore of Lake Erie, or by way of Lake Michigan to more interior portions of the country.

By far the most interesting of these storage pits was that discovered by Edwin J. Hulbert in 1858, and opened by him in February, 1865. This pit was situated on the crest of the hill about midway between the head of Torch lake, where the Calumet & Hecla stamp mills are now located, and Lake Superior. The position on the hill is now a part of the Calumet & Hecla location, and No. 1 shaft of the Calumet mine was sunk through this ancient pit. It is a generally accepted theory that one route of the ancient miners was through Torch lake in their canoes, then a carry of nine miles over the hills to Lake Superior, and thence to Isle Royale. This would cut off the long journey of some eighty miles by water around Keweenaw point. By a singular coincidence, this storage pit was dug by the ancient miners directly above the famous Calumet lode, but there is no evidence to show that the men who dug it originally ever knew of the richness below, for the lode lay beneath a heavy over-burden of earth, and the ancient miners did not go down deep enough to uncover the rock below. It was not an exploration pit, but a storage pit pure and simple. This pit was about 50 ft. in diameter, practically nearly circular in shape, and presented the appearance of a huge bowl-shaped depression in the earth. When the pit was opened it showed a covering of earth nearly 4 ft. in thickness, well laid, and free from stones or rock. Under this was a vast deposit of green carbonate of copper, nearly twenty tons of which was taken out and sent to the smelting works at Hancock, 14 miles away. Thus the Calumet stockholders of 1865 reaped the benefit of the labors of the ancient miners centuries before. Everything found in the pit tended to show that it had been partially filled with pieces of native copper for storage purposes. There was not found a single tool or implement of any kind, such as were employed by the ancient miners in the extraction of copper from the rock, or such as were invariably found in all the ancient workings of explorers in the counties of Keweenaw, Houghton, Ontonagon and on Isle Royale. The men who took out the carbonate of copper found oblong birch baskets, used for carrying the copper to the pit; skeins of narrow, flat threads of spruce roots used for binding the bark to the bale of the basket; sheets of birch bark, used for repairs, and pieces of tanned deerskin for mending or making moccasins. These articles were all in a fair state of preservation, due to the carbonate of copper. Centuries of time must have elapsed to have changed the native copper, which the miners placed in the pit, into the carbonate form. No better proof can be offered to the great antiquity of the working of these ancient miners than that presented by the opening of this ancient storage pit, showing the changing of this great deposit from native copper to the green carbonate. Probably more than 200 of the pits and workings of the ancient miners were opened by explorers from 1843 to 1890, but in the history of the copper country this pit stands unique. With the exception of the small deposit found at the Winthrop mine in 1852, nothing like it had been discovered before, and nothing since.

LEFT NO TRACE OF THEIR IDENTITY.

The route taken by the ancient miners to their workings in what is now Ontonagon county, was doubtless through Portage lake, thence by a small stream connecting Portage lake with Lake Superior. This stream was obliterated when the present ship-canal, 100 ft. wide and $2\frac{1}{4}$ miles in length, was cut through in the years 1866 to 1873. At the western end of this canal is a high, sandy bluff, now mostly covered with a sparse growth of trees of small size. That this location was occupied as an intermediary camping place there is not much doubt, for when the canal was cut through this bluff, large numbers of copper tools, axes, spears and arrow heads were found. It may be that here was the working place of the ancients in the manufacture of tools, etc., from the copper found on the Ontonagon range; for the long, gently-sloping ground toward the east and the waters in Portage lake, would make an ideal camp—sheltered as it would be from the western winds blowing across Lake Superior.

What calamity befell the ancient miners, who can tell? That they left the country at the close of one season, expecting to return at the opening of next, is reasonably certain. The pits, the charcoal, the stone hammers, the implements and tools of copper, are the only relics left of the race which discovered and worked the Lake Superior mines. Not the vestige of a dwelling, a skeleton, or a bone has been found. From the earliest acquaintance of the white man with the Indians inhabiting the copper country, not a tradition or legend is extant of these ancient miners; for the Indians themselves had no knowledge of the existence of copper, save as they found the pieces of float copper on the surface. When we consider the extent of country over which this mining work extended, and the slow and crude process of labor, and the immense amount of work done, we are forced to believe that the time thus spent extended through many, many years of time, and was carried on by vast numbers of people who were as active and as enterprising in their way as those who, centuries later, have made the copper country of Lake Superior the wonder of the world.

REPORTS FROM THE SHIP BUILDERS.

PROGRESS ON THE LARGE HILL PACIFIC LINERS—LEWIS NIXON SECURES AN ORDER FOR A \$500,000 YACHT—ACTIVITY IN WOODEN SHIP BUILDING ON THE PACIFIC AND IN NOVA SCOTIA.

Frames are being erected on the first of the mammoth steamships building for the Great Northern Steamship Co. at the yard of the Eastern Ship Building Co., New London, Conn. The double bottom is well in frame for a length of 400 ft. on each vessel and work is progressing rapidly. The keels of these vessels were laid about two months ago. The Carnegie Steel Co., Illinois Steel Co., and the Phoenix Iron Co. are furnishing the 25,000 tons of steel required for the building of these vessels and the American Steel & Wire Co., Reading, Pa., works, are furnishing the 5,000,000 rivets required. It is expected that these vessels will be launched in a little over a year. Shafts for these ships now being forged by the Midvale Steel Co., Philadelphia, are of high-grade, carbon steel, 85,000 lbs. ultimate tensile strength, 45,000 lbs. elastic limit and 25 per cent. elongation. The length of each line from the forward end of the crank shaft to the after end of the tail shaft is about 260 ft. The crank shaft is 18 in. diameter; line shaft, 17 in.; tail shaft, 19 in. Mr. James J. Hill's steam yacht Wacouta, better known as the Eleanor, left the New London yard on Saturday last, after a complete overhauling. Some of her interior arrangements have been changed, but a most pronounced change and improvement has been caused by the addition of a large pilot house on the top of the deck house forward. The Wacouta has been frequently described as the most successful deep-sea pleasure cruiser afloat. She has already steamed 100,000 miles, and with her large barque-rigged sail spread she can show good speed under canvas alone.

At present there is considerable activity in wooden ship building in Nova Scotia. D. A. Huntley of Parrsboro is building a barkentine for Capt. Baxter of Canning. He also has the frame for a three-masted schooner ready to put up. Patrick McLaughlin of Parrsboro has a two-masted schooner nearly completed. Capt. D. S. Howard, also of Parrsboro, is fast getting together the frame of a four-masted schooner, and at Port Greville the firm of H. Elderkin & Cohave is building a three-masted and a two-masted schooner. Cochrane & Soley of Parrsboro are building a large three-master and J. E. Pettis of the same place a small three-master. At Spence's island the Spence Island Co. is building a barkentine and John N. Spicer is getting out the frame for a large three-master.

A builders' trial trip of the West Shore Railway ferryboat West Point, last week, was a pronounced success. The New York Central & Hudson River Railroad Co. gave the contract for this vessel a year ago to the W. & A. Fletcher Co., but the contract for building the hull was sublet to T. S. Marvel & Co. of Newburg, N. Y. The hull is of mild steel, 178 ft. long between perpendiculars and 208 ft. long over all; breadth, molded, 40 ft.; over guards, 66 ft.; depth, molded, amidships, 18 ft.; height from water to top of plank shear at ends, 6 ft. 9 in. The vessel is equipped with two direct acting jet condensing engines. The high pressure cylinders are 18 in. in diameter and the low pressure 38 in., with 28-in. stroke. The two boilers are of the Scotch type, 12 ft. 9 in. in diameter and 11 ft. long.

A demand on the Pacific for more vessels in both the coasting and Hawaiian trade has given an unprecedented activity to the building of wooden ships in all of the Puget Sound yards. The four-masted schooner George McDonald was launched last week at the Hoquiam ship yards. She cost \$50,000 and will carry 900,000 ft. of lumber. E. Cousins of Aberdeen, Wash., is building two schooners. At the Lindstrom yards at Aberdeen a steam schooner and a sailing schooner are being built. Similar activity prevails in the ship yards at Tacoma, Port Blakely and Fairhaven. The Puget Sound Dry Dock Co. of Tacoma has a job of repairs on the steamship City of Topeka, wrecked in Alaska, that involves an expenditure of \$65,000.

The Maryland Steel Co., Sparrow's Point, Md., has informed the navy department that the torpedo boat Tingey will be ready for launching about March 20. The Tingey has been named in honor of Com. Thomas Tingey, who laid out the Washington navy yard and was its first commandant. The sponsor for the Tingey will be Miss Annie Truxton Craven of Tuckahoe, N. Y., who is a granddaughter of the late Admiral Thomas Tingey Craven, United States navy. Admiral Craven was himself a grandson of Com. Tingey.

Henry Clay Pierce of St. Louis has placed an order with Lewis Nixon of the Crescent Ship Yard, Elizabeth, N. J., for the construction of a steel steam yacht that is to cost about \$500,000. The yacht will be 240 ft. long, up to date in every particular and quite fast. Henry Clay Pierce is president of the Waters-Pierce Oil Co. of St. Louis. Mr. Nixon denies the report that J. Gardner Cassett of Philadelphia, brother of A. J. Cassett, president of the Pennsylvania Co., has also placed an order with him for a yacht.

A four-masted wooden schooner, the Malcolm B. Seavey, was launched at G. G. Deering's ship yard, Bath, Me., a few days ago. Capt. E. D. Atkins will command her. The vessel registers 1,247 tons gross and 1,061 tons net and has two full decks.

The steamer Oregonian, built for the American-Hawaiian Steamship Co., was launched March 4 at Roach's Ship Yard, Chester, Pa. The vessel will ply between New York, San Francisco and Honolulu.

With the opening of another season of navigation on the great lakes close at hand, officials of the United States weather bureau ask that attention be directed to special arrangements made at Sault Ste. Marie for the convenience of vessel masters and for the better conduct of the work of the bureau at that point. The weather bureau has constructed an office building on the canal grounds near the locks. All masters are cordially invited to call at the office at any time, day or night. The office is supplied with a long-distance telephone. The storm warning flags are displayed on a staff which is located at the northwest corner of the office building. The night warnings (electric light) are displayed from the mast on the top of the building; they are visible for about five miles up the river and about six miles down the river in the new channel. Special attention is given to setting barometers, and all masters are requested to avail themselves of this feature of the service.

PACIFIC COAST SHIP BUILDING DURING 1900.

The annual report of the Chamber of Commerce of San Francisco contains a list of the vessels documented on the Pacific coast during 1900. The list does not, of course, include all the vessels that were built on the Pacific coast during 1900, because it does not take into account the vessels under construction or those for which documents had not been sought up to the close of the year. It shows, however, the steady growth of Pacific coast ship building.

Rig.	Name.	Builders.	Where built.	Gross tons.	Net tons.
Schr...	Expansion.....	Alex. Hay.....	Alameda.....	545	512
Stmr...	Potrero.....	Risdon Iron Works..	Alameda.....	531	452
Stmr...	Commodore.....	E. J. Stone.....	San Francisco.....	44	33
Schr...	Stanley.....	.....	Fairhaven.....	355	253
Stmr...	Reporter.....	John F. Twigg.....	San Francisco.....	38	26
Stmr...	Robt. Dollar.....	.....	Hoquiam, Wash.....	1,389	845
Schr...	Annie L.....	E. Munder.....	San Francisco.....	60	53
Schr...	Jas. L. Eviston.....	.....	Marshfield, Or.....	755	662
Stmr...	Richmond.....	Fulton Iron Works..	San Francisco.....	135	77
Schr...	Churchill.....	.....	North Bend, Or.....	655	600
Stmr...	Rainier.....	.....	Hoquiam, Wash.....	800	519
Stmr...	Meteor.....	A. M. Wilson.....	San Francisco.....	68	40
Stmr...	Santa Ana.....	.....	Marshfield, Or.....	1,250	814
Stmr...	Nome City.....	H. D. Bendixsen.....	Fairhaven.....	1,660	1,294
Stmr...	Kvichak.....	.....	Portland, Or.....	1,063	610
Stmr...	Onisbo.....	Chas. Ruling.....	Woodland, Cal.....	632	605
Schr...	Luzon.....	Alex. Hay.....	Alameda.....	545	512
Stmr...	Shelikof.....	Risdon Iron Works..	Alameda.....	173	101
Schr...	Rosamond.....	Matthew Turner.....	Benicia.....	1,030	985
Stmr...	Eureka.....	C. P. Doe.....	Wilmington.....	484	312
Schr...	Wm. Olsen.....	E. B. Wright.....	Alameda.....	523	491
Stmr...	Alexander Volta.....	Fulton Iron Works..	San Francisco.....	38	23
Stmr...	Cordelia Heald.....	John L. Heald.....	Oakland.....	69	39
Stmr...	John L. Kimball.....	C. G. White.....	Everett, Wash.....	1,588	1,208
Schr...	A. B. Johnson.....	.....	Aberdeen, Wash.....	529	460
Stmr...	Alton.....	James Gillis.....	Stockton.....	106	93
Schr...	Commerce.....	Alex. Hay.....	Alameda.....	658	621
Schr...	Forest Home.....	.....	Marshfield, Or.....	763	682
Schr...	Ariel.....	Matthew Turner.....	Benicia.....	726	684
Schr...	Bainbridge.....	.....	Port Blakely, Wash..	566	496
Stmr...	Santa Barbara.....	W. F. Stone.....	San Francisco.....	695	527
Stmr...	San Pablo.....	Union Iron Works..	San Francisco.....	1,584	966
Stmr...	Mandalay.....	.....	North Bend, Or.....	438	266
Stmr...	Coronado.....	.....	Aberdeen, Wash.....	578	331
Schr...	Forester.....	Alex. Hay.....	Alameda.....	658	621
Stmr...	Nonpareil.....	A. M. Wilson.....	San Francisco.....	62	31
Stmr...	Eclipse.....	Matthew Turner.....	Benicia.....	211	163
Schr...	Nome.....	Matthew Turner.....	Benicia.....	231	193
Schr...	York.....	Matthew Turner.....	Benicia.....	231	193
Stmr...	California.....	Union Iron Works..	San Francisco.....	5,879	4,597
Schr...	R. C. Slade.....	.....	Aberdeen, Wash.....	673	601
Stmr...	Rio Vista.....	E. Jarvis.....	Stockton.....	13	10
Stmr...	King Fisher.....	R. W. Schultz.....	San Francisco.....	11	3
Stmr...	Dawn.....	J. C. Beetle.....	Alameda.....	12	9
Stmr...	Queen.....	Geo. W. Kneass.....	San Francisco.....	24	16
Stmr...	Uganuk.....	John F. Twigg.....	San Francisco.....	13	8
Stmr...	Islam.....	J. C. Beetle.....	Alameda.....	11	7
Stmr...	Dorothy.....	W. F. Stone.....	San Francisco.....	8	5
Stmr...	Letha R. Thomas.....	W. F. Stone.....	San Francisco.....	11	7
Stmr...	Kid.....	Denis Sullivan.....	San Francisco.....	14	12
Schr...	Pathfinder.....	Matthew Turner.....	Benicia.....	86	71
Total tonnage.....				29,221	22,779

BRITISH NAVAL PROGRAM.

A dispatch from London says that the British naval estimates for 1901-02 amount to £30,875,500, an increase of over £2,000,000, chiefly for ship building. There is an increase of 3,754 in the number of officers and men. The new ship building program provides for three battleships, six armored cruisers, two third-class cruisers, ten torpedo boat destroyers, five torpedo boats, two sloops of war and five submarine boats. On some of these vessels work was begun in 1900. All the ships will be in course of construction this year.

Under the heading of "submarine boats," the admiralty report says: "Five of the type invented by Holland have been ordered, the first of which should be delivered next autumn. What the future value of these boats may be in naval warfare can only be a matter of conjecture. Experiments with these boats will assist the admiralty in assessing their true value. The question of their employment must be studied in all its developments and their mechanism carefully watched in this country."

During the year arrangements will be made with nearly all the great steamship companies by which their finest vessels will be held at the disposition of the admiralty for employment as armed cruisers when required. To the lines previously engaged have been added the Orient, Royal Mail and the Pacific companies. Eighteen of the largest and swiftest passenger steamers of these lines will receive an annual subvention. The steamers have been placed at the disposition of the admiralty without further subsidy.

It is said that the committee of the admiralty which has been considering the different types of boiler for the past six months condemns the Belleville boiler and that their report says: "The advantages of water tube boilers for naval purposes are so great, chiefly from a military point of view, that, provided a satisfactory type of water tube boiler could be adopted, they would be more suitable for the navy than the cylindrical boiler. The committee does not consider that the Belleville boiler has any such advantage as to lead them to recommend it as the best adapted to the requirements of the navy. They recommend, as regards the ships to be ordered, that the Belleville boilers be not fitted in any case, and that in the ships under construction Belleville boilers be not used if work on the boilers is not far advanced. Where a change of boilers would delay the completion of the ships Belleville boilers should be retained and they should also be retained in completed vessels. The committee is considering various types of large, straight-tube boilers, and vessels will be fitted with each kind."

Of the total estimate for new construction, which is £9,003,256, £8,465,406 will be devoted to work in hand, and the rest to starting the new program. The estimates conclude with a statement that "a bill to provide money for certain new naval works will shortly be introduced."

The treasury department has just issued a warrant in favor of Admiral Dewey for \$9,570, his share of the prize money found due him by the court of claims for the destruction of the Spanish fleet at Manila.

NAVAL ARCH IN NEW YORK.

The project for a great memorial monument to perpetuate the deeds of the nation's naval heroes, which was undertaken some months ago by the Alumni of the Naval Academy, will, it can now be stated, be successfully carried out. The memorial will be situated in Battery Park, New York, near the sea wall and will compare favorably in point of beauty, size and environment with anything of the kind in any country. The committee appointed to carry out the project is composed of Park Benjamin, chairman; Robert M. Thompson, treasurer; Rear Admiral Erben, Rear Admiral Miller, Capt. J. W. Miller, Naval Militia; Herbert L. Satterlee, Lewis Nixon, George Edward Kent, B. S. Sloane and Lieut.-Com. Leonard Chenery.

Mr. Benjamin said this week that the committee wished it understood that the project was in no way connected with the proposition to perpetuate the Dewey arch, nor had it received any of the funds subscribed for that purpose. He also declared that no canvassers or collectors had been sent out, despite reports to the contrary. Admiral Dewey, he said, had nothing to do with the project except as a brother graduate, who had sent his hearty wishes for its success. After careful consideration Battery Park was selected as the place most suitable for the memorial, and the mayor, the municipal art commission and the park commissioners have all approved of the choice of the committee.

The question of design was then taken up and Ernest Flagg, architect of the Corcoran art gallery in Washington, the St. Luke's hospital buildings, of the new buildings for the naval academy at Annapolis, was invited to submit a design and plans.

"Mr. Flagg's design was submitted to the committee some days ago," said Mr. Benjamin, "and was accepted almost at first glance. It is indescribably beautiful and is so comprehensive in scope as to leave nothing to be desired. The arch itself, while embodying some of the best points of the famous ancient and modern arches, is in the main of original design. It will be about 170 ft. high, almost twice the height of the Dewey arch, and a little taller than the Arc de Triomphe in Paris. It will be 125 ft. wide. It will be surmounted by a quadriga of sea horses which will be flanked by ancient war barges filled with trophies. At the bases of the piers of the arch there will be four great bas reliefs typefying historical events in our naval history: Farragut in the rigging, Paul Jones on the deck of the Bon Homme Richard, Perry on Lake Erie and the death of Lawrence.

"Inside in niches will be statues of the admirals of the navy and spaces for statues of future admirals. There will also be tablets for the names of heroes, but the committee wishes it to be understood that no one will be so honored who has not been dead at least twenty-five years. Approach to the arch from the harbor will be through a beautiful sea gate enclosing a sufficient basin and landing stage. Two piers will extend a short distance beyond the sea wall and at the end of each will be an immense beacon. The arch will stand about one hundred ft. back of the river edge of the basin and will be approached by steps and terraces. A great plaza round about will be ornamented with statuary and trophies. A wide marble tiled walk, edged with a marble balustrade, will lead to the arch from the street. The entire structure will be of white marble and will take at least three years to complete."

The committee have assurances from men of means that they will give largely toward defraying the cost of the project, but in addition the city, state and national government will be asked to contribute. It is expected that the work of construction will be begun early in the spring.

IRON, STEEL AND KINDRED PRODUCTS DURING 1900.

The Bulletin of the American Iron & Steel Association has issued in tabular form, for convenient reference, all the statistics relating to iron and steel and kindred products that have yet been compiled for 1900. Below will be found a comparative table of the leading products. Unless otherwise specified the gross ton (2,240 lbs.) is meant:

Products.	1899.	1900.
Shipments Lake Superior iron ore, tons.....	18,251,804	19,059,393
Shipments Connellsville coke, net tons.....	10,129,764	10,166,234
Shipments of Cumberland coal, tons.....	6,131,461	5,171,916
Production of pig iron, tons.....	13,620,703	13,789,242
Consumption of pig iron, tons.....	13,779,442	13,177,281
Unsold stocks of pig iron, Dec. 31, tons....	68,309	446,020
Imports of iron and steel, tons.....	172,774	209,066
Exports of iron and steel, tons.....	942,659	1,154,504
Imports of iron ore, tons.....	674,082	897,792
Imports of manganese ore, tons.....	188,349	256,252
Imports of iron and steel, values.....	\$15,800,579	\$20,443,908
Exports of iron and steel, values.....	\$105,690,047	\$129,633,480
Exports of anthracite coal, tons.....	1,707,796	1,662,286
Exports of bituminous coal, tons.....	4,044,354	6,255,033
Locomotives built by independent shops, No..	2,473	3,153
Cars built by independent shops, No.....	123,893	124,106
Steel cars built, included above, No.....	10,500	14,464
Pig iron made in Germany, metric tons.....	8,143,132	8,422,842

GRAIN AT THE HEAD OF THE LAKES.

Mr. G. A. Tomlinson, vessel agent at Duluth, furnishes the following statement of grain in store at the head of the lakes on Saturday, the 9th inst., and on the corresponding date in 1900:

	1900.	1901.
Wheat	13,041,601	8,029,137
Barley	178,130	74,617
Flax	313,599	326,389
Oats	169,216	1,048,830
Rye	405,213	327,557
Corn	910,739	4,622,951
Total	15,018,498	14,429,481

Weather in the vicinity of Duluth has turned quite cold of late, and although clear water can be seen from the piers, the ice in the harbor and outside is fully as thick as a year ago this time. There is no inquiry for vessel capacity for opening shipment, and the market on all kinds of grain continues to be out of line.

HON. C. A. PARSONS ON THE MERCHANT MARINE TURBINE.

At the meeting of the Institution of Engineers and Ship Builders, held in Glasgow recently, the Hon. C. A. Parsons read a paper on the "Merchant Marine Turbine" and gave some details of the turbine-driven vessel now building by Messrs. Wm. Denny & Bros., Dumbarton, for the Fairlie-Campbelltown service. Her dimensions are: Length, 250 ft.; beam, 30 ft.; depth, molded, to main deck, 10 ft. 6 in.; depth, molded, to promenade deck, 17 ft. 6 in. Her general arrangements are somewhat similar to those of the usual modern type of river or coasting pleasure steamer, but slight modifications have been introduced to suit turbine machinery. The machinery consists of three separate turbines driving three screw shafts. The high-pressure turbine is placed on the center shaft and the two low-pressure turbines each drive one of the outer shafts. Inside the exhaust ends of each of the latter are placed the two astern turbines, which are in one of the low-pressure motors and operate by reversing the direction of rotation of the low-pressure motors and outside shafts. In ordinary going ahead the steam from the boilers is admitted to the high-pressure turbine, and after expanding about five fold passes to the low-pressure turbines, and is again expanded in them about another twenty-five fold, and then passes to the condensers, the total expansion ratio being about 125 fold, as compared with from eight to sixteen fold usual in triple expansion reciprocating engines. At 20 knots the speed of revolutions of the center shaft will be 700, and of the two outer shafts 1,000 per minute. When coming alongside a jetty, or maneuvering in or out of harbor, the outer shafts only are used, and the steam is admitted by suitable valves directly into the low-pressure motors, or into the reversing motors for going ahead or astern, on each side of the vessel. The high-pressure turbine, under these circumstances, revolves idly, its steam admission valve being closed, and its connection with the low-pressure turbines being also closed by non-return valves. By this arrangement great maneuvering power is obtained. The main air pumps are compound and worked by worm gearing from the main engines in the usual way. There are also small auxiliary air pumps worked from the circulating engines for draining the condensers before starting the other auxiliary machinery, as is usual in vessels with reciprocating engines. There is a feed heater fed from the exhaust steam of the auxiliaries, and also when necessary by steam drawn from an intermediate point in the expansion of the main turbines. The boiler is of the usual double-ended Scotch pattern. The speed of the vessel is expected to surpass that of any similar boat at present on the Clyde.

THE POLLOK MEMORIAL PRIZE.

From time to time we have called the attention of inventors to a prize of 100,000 francs (\$20,000), to be known as the Anthony Pollok prize, offered by the heirs of the late Anthony Pollok of Washington, who lost his life in the fatal collision of the steamship La Bourgogne with the Cromartyshire, off Sable island, nearly three years ago. The prize, it will be remembered, is to be awarded to the inventor of the best device for fulfilling one or all of these conditions, to wit: To prevent collision at sea, to save the ship in case of collision, to save the passengers and crew collectively in case the ship is abandoned. Previous experience has shown that many devices and apparatus offered could not be practically relied on in case of accident, owing to the limited number of the crews of merchant vessels. It has therefore been decided to exclude devices designed to save individuals separately, such as life belts, waistcoats, buoys, etc.; such apparatus which encumber the decks so as seriously to interfere with the carrying capacity both as to passengers and freight, or such as could not be readily adapted and used on ships now in general service; all improvements or modifications of inventions already recognized as insufficient for the purpose of saving the passengers and crew collectively, such as lifeboat davits, oil-throwing devices, etc.; rafts of all kinds which must be mounted, assembled or inflated at the time of the accident; and hatch covers, deck houses, etc., which are designed to float automatically when the ship sinks. The devices and inventions may be presented in full size ready for trials or models and drawings showing all details may be submitted. The competition will be opened at Havre on Sept. 9, 1901. The jury will consist of men whose competency is unquestionable and will have power to prescribe tests and trials. All possible facilities will be offered to the inventor; but all expense must be borne by him. The exposition of devices entered in the competition will be held at Havre under the auspices of the chamber of commerce of that city. No charge will be made for space, or for the care of the exhibits. If the exhibit be marked "Prix Anthony Pollok" no duty will be exacted by the French customs officials. The devices must be delivered free of charge at Havre between Aug. 1 and Sept. 1, 1901, and addressed "Concours Prix Anthony Pollok. Capitaine S. Dechaille, Directeur du Service des Signaux et du Sauvetage de la Chambre de Commerce, Havre, France."—Scientific American.

LAUNCH OF MORGAN LINER EL VALLE.

[Special correspondence to the Marine Review.]

Newport News, Va., March 13.—The first launching of the new century at the ship yard here was successful in every respect. Instead of the Korea of the Pacific Mail line, which everybody expected to go overboard first, the El Valle of the Morgan line was the vessel selected. Miss Maude Eleanor Converse, daughter of Capt. Converse of the battleship Illinois, was the sponsor. The vessel went off without a hitch, and the ceremonies were witnessed by about 10,000 people, despite the fact that there was a heavy downpour of rain. This is the first of a third quartet of steamers built by the local yard for the Morgan line people. Four were built in the early nineties and were taken by the government in the war with Spain. In 1899 four more were built to take the places of those sold to the government. About twelve months ago the company found it necessary to again increase its fleet and the contract for four more vessels was given the local yard. Three more are to be built, two of which are already well under way. All of the old vessels are still in active service, except the Yosemite, formerly the El Sud, which was recently lost in a typhoon at Guam. Coincident with the launching of El Valle came the official announcement that the Korea of the Pacific Mail line would be launched March 23. This will be the largest vessel ever launched on the American continent.

W. F. L.

WHAT UNITED STATES STEEL CORPORATION MEANS.

A GREAT COMBINATION OF COMPANIES WITHIN COMPANIES—HOW THOROUGHLY IT COMPREHENDS THE STEEL BUSINESS FROM THE RAW MATERIAL TO THE RAMIFIED FINISHED PRODUCT.

As a matter of current interest of considerable importance the Review prints below a compilation of the companies included in the United States Steel Corporation and what each company possesses. The United States Steel Corporation is a combination of the Carnegie Co., the Federal Steel Co., the National Steel Co., the American Steel & Wire Co., the National Tube Co., the American Tin Plate Co., the American Steel Hoop Co. and the American Sheet Steel Co. These constituent companies are in turn made up of a great number of individual companies. It is necessary to chronicle these numerous companies before the widespread scope and influence of the United States Steel Corporation can be thoroughly understood, and how completely it comprehends the iron and steel making industry from the raw material to the finished product—and even the ramifications of the product remote from the raw material. Indeed, in this respect the corporation is likely to seek further expansion. The American Can Co., which is being formed in New York this week, consumes the greater part of the output of the American Tin Plate Co. and a fair part of the output of the American Sheet Steel Co., and as it is a concern promoted by the Moore Bros., it is likely to come knocking at the doors of the corporation for admission. There is a never failing market for cans, and it is growing enormously. It is not unlikely, too, that the American Bridge Co. will seek admission. However, this article is confined to the tangible property of the companies already included in the United States Steel Corporation.

To begin with these companies mined last year in the Lake Superior region from their own mines about 9,400,000 out of a total product of 19,059,393 gross tons of iron ore. They own fifty-six steel vessels on the great lakes, capable of moving in a single season from the head of Lake Superior, about 5,700,000 gross tons of iron ore. So much for raw material and lake transportation. In the enumeration of the plants and tangible properties of the constituent companies the Carnegie Co. is given first because it is the biggest. This company has the following constituents: Edgar Thomson Steel Works, Bessemer, Pa.—Nine blast furnaces, four 15-ton Bessemer steel converters and two rail mills. Duquesne Steel Works, Cochran, Pa.—Four blast furnaces, Bessemer steel plant, open hearth steel plant, twelve 50-ton furnaces, two billet mills, angle bar mill and continuous bar mill. Carrie furnaces—Two completed blast furnaces, two blast furnaces building. Lucy furnaces—Two completed blast furnaces. Homestead Steel Works—Bessemer plant, forty open hearth furnaces, four blooming mills, four structural trains, two slabbing mills, four plate mills, one 3,000-ton and one 10,000-ton press. Other manufacturing concerns in the Carnegie Co. are the Howard Axle Works, Lower Union Rolling Mills and Upper Union Mills at Pittsburgh. H. C. Frick Coke Co., Scottdale, Pa.—Owns 40,000 acres of coal lands, 20,000 acres of surface lands and 11,652 coke ovens in Westmoreland and Fayette counties, Pa.; owns 2,628 railroad cars; markets production of 1,600 outside ovens. Carnegie Natural Gas Co.—Leases 98,000 acres gas territory in Allegheny, Washington, Armstrong and Westmoreland counties, Pa., and Wetzel and Doddridge counties, W. Va., with 130 producing wells and 3,000 miles main and branch pipe lines. Union Railroad Co.—Owns 39.52 miles and leases 12.61 miles of track. Pittsburgh & Conneaut Dock Co.—Operates docks at terminus of Pittsburgh, Bessemer & Lake Erie Railroad at Conneaut; also owns 42.6 per cent. of stock of Pennsylvania & Lake Erie Dock Co. and 25 per cent. of stock of New York, Penna. & Ohio Dock Co. Trotter Water Co.—Pumping plant on Youghiogheny river, 1½ miles above Connellsville, Pa. Youghiogheny Northern Ry. Co.—Line from Broad Ford to Summit, Fayette county, 24 miles, leased to Pittsburgh, McKeesport & Youghiogheny Railroad. Youghiogheny Water Co.—Pumping plant at Broad Ford, Pa. Mount Pleasant Water Co.—Pumping plant at Bridgeport, Fayette county, Pa. Pittsburgh, Bessemer & Lake Erie Railroad—Operates 203.31 miles of railroad between Conneaut, Erie, Pa., and North Bessemer, Pa. Oliver Iron Mining Co.—Owns Metropolitan Iron & Land Co. (Norrie, Aurora and Tilden mines on Gogebic range); 89.3 per cent. of stock of Lake Superior Iron Co. (Mountain Iron on Mesabi range); 98 per cent. of stock of Security Land & Exploration Co.; estimated output of mines nearly 5,000,000 tons per annum. Pittsburgh Steamship Co.—Owns eleven steamships and two tugs. Pittsburgh Limestone Co., Ltd.—Operates quarries at Tyrone and Williamsburg, Blair county, and Wick, Butler county, Pa.; daily capacity 4,500 tons.

The constituent companies of the Federal Steel Co. are as follows: Minnesota Iron Co., Illinois Steel Co., Lorain Steel Co. of Ohio, Lorain Steel Co. of Pennsylvania, Elgin, Joliet & Eastern Railway. The Minnesota Iron Co. contributes the following property: 150,300 acres of mineral lands in Minnesota and Michigan, on which are located various iron mines, the Minnesota, Auburn, Fayal, Genoa, Elba and Chandler being in active operation; the Duluth & Iron Range Railroad, consisting of 175 miles of main line of railroad, extending from the Minnesota Iron Co.'s and other mines on the Mesabi and Vermillion ranges in Minnesota to the ore docks at Two Harbors on Lake Superior; also five large ore docks at Two Harbors and ample equipment for the transportation of 5,000,000 tons of iron ore per season besides a large volume of other business; twelve steel steamers and ten barges, operated under the name of the Minnesota Steamship Co., and a controlling interest in the property of the Minnesota Dock Co., consisting of valuable docks at Buffalo, N. Y., and at Ashtabula, Ohio. The Illinois Steel Co. contributes the Cundy mine at Quinnesec, Mich.; the Johnston mine at Crystal Falls, Mich.; four-fifths interest in 1,080 acres of ore lands at Iron Range, Dodge county, Wis.; 5,908 acres of mineral lands in Michigan; steel works located at South Chicago, North Chicago, Joliet, Ill., and Milwaukee, Wis., consisting of 804 acres of land, seventeen blast furnaces, ten open hearth furnaces, two steel mills, two rail mills, two rod mills, one cotton tie mill, one slabbing mill, one plate mill, two merchant mills, steel and iron foundries and steel cement plant; the Chicago, Lake Shore & Eastern railroad, consisting of 150.24 miles of tracks owned, connecting the several works of the Illinois Steel Co. with intersecting lines of railroad, and also trackage rights over 149 miles of other railroad. The Lorain Steel Co. contributes the following property: 975 acres of mill

property, two blast furnaces, two steel mills and one rail mill, power plants, laboratories and office buildings. The Johnstown, Pa., plant of the Lorain Steel Co. comprises the following: 150 acres of mill and other property, steel and iron foundries, machine and erecting shops for the manufacture of railway frogs, switches, crossings; the Lake Terminal Railroad and the Johnstown & Stony Creek Railway, owning respectively the terminal railroads connecting the steel works at Lorain, O., and Johnstown, Pa. The Elgin, Joliet & Eastern Railway Co. owns 196.47 miles of main line and trackage rights over 16.36 additional miles, extending from Waukegan, Ill., to Porter, Ind., forming a belt line around Chicago and intersecting every railroad entering there at an average distance of 30 miles therefrom; also branches to Aurora, Ill., to the Wilmington coal fields, to Whiting, Ind., and to South Chicago, where extensive docks, warehouses and other terminals are owned; also extensive docks and terminals at Waukegan. The Federal Steel also controls the following coal and coke properties: S. W. Connellsville Coke Co., consisting of 1,650 acres of coking land near Mt. Pleasant, Pa., with a plant thereon of 1,217 ovens; also 6,000 acres of coking coal lands in Fayette county, Pa., with three coking plants thereon aggregating 1,200 ovens, together with a railroad (Masontown & New Salem Railroad) connecting the several coking plants; also 4,400 acres of coking land in Raleigh county, West Virginia, and 904 acres of coal land near Johnstown, Pa.

The National Steel Co. owns and controls the following plants: Ohio Steel Co., Youngstown, O.; Shenango Valley Steel Co., New Castle, Pa. (steel plant and furnaces); King, Gilbert & Warner, Columbus, O.; Bellaire Steel Co., Bellaire, O.; Aetna Standard Iron & Steel Co., Mingo Junction, O. (steel plant and blast furnaces); Buhl Steel Co., Sharon, Pa.; Sharon Iron Co., Sharon, Pa. (blast furnace only); Rosena Furnace Co., Newcastle, Pa. (furnace); Thomas Furnace Co., Niles, O. (furnace); Ohio Iron Co., Zanesville, O. (furnace); Columbia Iron & Steel Co., Uniontown, Pa.; Standard-Connellsville Coke Co., Pleasant Unity, Pa.; Continental Coke Co. (two coking coal tracts at Uniontown, Pa.). The National Steel Co. has extensive improvements under way in the shape of furnaces, billet mills and coke ovens. It also owns the Chapin and other ore mines in the Lake Superior region and nine steel steam freighters on the lakes.

The American Steel & Wire Co. owns and controls the following establishments: Washburn & Moen Mfg. Co., with two plants at Worcester, Mass., one at Waukegan, Ill., and one at San Francisco, Cal.; Worcester Wire Co., plants at Worcester, Mass.; Cleveland Rolling Mill Co., plants at Cleveland and iron mine property at Negaunee, Mich.; Indiana Wire Fence Co., plant at Crawfordsville, Ind.; Garden City Wire & Spring Co., plant at Chicago; Consolidated Barb Wire Co., plants at Joliet, Ill., and Lawrence, Kas.; Laidlaw Bale Tie Co., plant at Joliet, Ill.; Cincinnati Barb Wire Fence Co., plant at Cincinnati, O.; Union Rolling Mill Co., plant at Cleveland known as Emma furnace; Portage Iron Co., plant at Duncansville, Pa.; Newburgh Wire & Nail Co., plant at Newburgh, N. Y.; Allegheny Furnace Co., plant at Allegheny, Pa.; Pittsburgh Wire Co., plant at Braddock, Pa.; Shenango Valley Steel Co., plant at New Castle, Pa.; Oliver Wire Co., plant at Pittsburgh; Oliver & Snyder Steel Co., plant at Pittsburgh; Shoenberger Steel Co., plant at Pittsburgh; and also coal land and coke ovens in Fayette and Westmoreland counties; Puget Sound Wire Nail & Steel Co., plant at Everett, Wash.; Edgar Zinc Co., plants at St. Louis, Mo., and Cherryvale, Kas.; American Coke Co., comprising lands in Westmoreland, Green and Fayette counties, Pa., and coke ovens in Westmoreland and Fayette counties; American Supply Co. at Baggaley, Pa.; American Mining Co., comprising Clark-Sauntry mines at Virginia, Minn., Cuff mines at Iron Mountain, Mich., and Negaunee mines at Negaunee, Mich.; Williamsburg, Pa., lime stone quarries; furnaces, railroad and ore property of Crown Point Iron Co., Crown Point, N. Y. The American Steel & Wire Co. has extensive improvements under way, including four open hearth furnaces at Cleveland, four open hearth furnaces at Worcester, one blooming mill at Worcester, four blast furnaces at Edith, Allegheny, one blast furnace at Central Works, Cleveland, one blast furnace at Neville Island, near Pittsburgh, 200 coke ovens in Westmoreland county, Pa., and 1,000 coke ovens and one 1,500-ton per day coal plant in Fayette county, Pa. The American Steel & Wire also owns a fleet of twelve large lake steamers.

The National Tube Co. owns and operates the following properties: National Tube Works at McKeesport and Pittsburgh, comprising the National Pipe Department, Boston Iron & Steel Works, National Rolling Mills, Monongahela furnaces, Monongahela Steel Works, Republic Iron Works, United States Seamless Tube Works, National Transportation Co., and the McKeesport Connecting Railway; Cohoes Tube Works, Cohoes, N. Y. (bedstead pipe and other tubular specialties); National Galvanizing Works, Versailles, Pa.; Syracuse Tube Co., Syracuse, N. Y. (special high-grade locomotives and marine boiler tubes); Pennsylvania Tube Works, Pittsburgh (lap and butt-weld pipe works, manufacturing gas, water and oil line pipe and other tubular specialties); Ohio Tube Co., Warren, O. (pipe plant for black and galvanized merchant pipe); Allison Mfg. Co.'s Boiler Tube Works, Philadelphia; Morris, Tasker & Co., and Delaware Iron Works, New Castle, Del. (electric light, telephone and telegraph conduits, poles and other tubular specialties); Chester Pipe & Tube Co.'s oil well tubing, casing and line pipe works, and lease of Tidewater Rolling Mill at Chester, Pa.; Oil City Tube Works, oil well tubing, casing, line and merchant, black and galvanized pipe plant at Oil City, Pa.; American Tube & Iron Co.'s lap-weld pipe and tube plant for regular and special long lengths at Youngstown, O.; American Tube & Iron Co.'s pipe, tube and galvanizing plant at Middletown, Pa.; Oil Well Supply Co.'s Elba Iron Works, rolling mills at Middletown, Pa.; Oil Well Supply Co.'s Continental Tube Works, Pittsburgh; Riverside Iron Works, bar and guide mills, blast furnaces, steel works, skelp mills, galvanizing works, nail factories, tube works, coke plant and coal properties. The coal properties owned are located as follows: Steubenville, O., 77 acres; Wheeling, W. Va., 200 acres; Benwood, W. Va., 328 acres; Fayette county, Pa., 996 acres; Pittsburgh Tube Works, pipe plant at Pittsburgh.

The American Tin Plate Co. owns and controls the following establishments: American Tin Plate Co., Ellwood, Ind.; American Tin Plate Co., Montpelier, Ind.; Beaver Tin Plate Co., Lisbon, O.; Crescent Sheet & Tin Plate Co., Cleveland; Falcon Tin Plate & Sheet Co., Niles, O.; Humbert Tin Plate Co., Connellsville, Pa.; Irondale Sheet & Iron Co., Richmond, Ind.; La Belle Iron Works, Wheeling, W. Va.; Monongahela Tin Plate Co., Pittsburgh; National Tin Plate Co., Anderson, Ind.;

National Tin Plate Co., Monessen, Ind.; Newcastle Steel & Tin Plate Co., New Castle, Pa.; Pennsylvania Tin Plate Co., New Kensington, Pa.; Shenango Valley Steel Co., New Castle, Pa.; Star Tin Plate Co., Pittsburgh; United States Iron & Tin Plate Mfg. Co., Demmler, Pa.; Wallace, Banfield & Co., Irondale, O.; Washington Steel & Tin Plate Mills, Washington, Pa.; Atlanta Steel & Tin Plate Co., Atlanta, Ind.; Baltimore Tin Plate Co., Baltimore, Md.; Blairsville Rolling Mill & Tin Plate Co., Blairsville, Pa.; Cincinnati Rolling Mill & Tin Plate Co., Cincinnati, O.; Cumberland Steel & Tin Plate Co., Cumberland, Md.; Ellwood Tin Plate Co., Ellwood City, Pa.; Great Western Tin Plate Co., Joliet, Ill.; Hamilton & Co., West Newton, Pa.; Johnstown Tin Plate Co., Johnstown, Pa.; Laughlin Nail Co., Martin's Ferry, O.; Marshall Bros. & Co., Philadelphia; the Morewood Co., Gas City, Ind.; Morton Tin Plate Co., Cambridge, O.; Neshannock Sheet & Tin Plate Co., New Castle, Pa.; Ohio River Sheet & Tin Plate Co., Agnew, Pa.; Reeves Iron Co., Canal Dover, O. This company has also acquired all the plants and machinery, exclusive of realty, used for manufacturing tin plate of the following companies: Etna-Standard Iron & Steel Co., Bridgeport, O.; Britton Rolling Mill Co., Cleveland (dismantled); Somers Bros., Brooklyn, N. Y. (dismantled); Stickney Iron Co., Baltimore, Md. (dismantled).

The American Steel Hoop Co. controls the following properties and plants: J. Painter & Sons Co., Pittsburgh; Isabella Furnace Co., Pittsburgh; William Clark's Sons Co., Pittsburgh; Lindsay & McCutcheon, Pittsburgh; Union Iron & Steel Co., Youngstown, O., which embraces the upper and lower mills at Youngstown and mills at Warren and Girard, O.; Monessen Steel Co., Monessen, Pa.; P. L. Kimberly Co., works at Sharon, Pa., and at Greenville, Pa.; Portage Iron Co., Duncanville, Pa.; Pomeroy Iron & Steel Co., Pomeroy, O.; also operating bar mills of the former Etna-Standard Works at Bridgeport and Mingo Junction, O. The company also owns the following ore and coke properties: One-fifth interest in Mahoning Steel & Ore Co., Hibbing, Minn., producing 1,000,000 tons of ore annually; one-third interest in coal property of National Mining Co., comprising about 7,000 acres at Bridgeville, near Pittsburgh; Isabella Furnace plant, embracing coal property at Cokeville, Pa., the ovens at Cokeville making about 350 tons of coke per day; one-half interest in Union Ore Co. The American Steel Hoop Co. also has extensive improvements under way.

The American Sheet Steel Co. controls the following properties: Etna-Standard Iron & Steel Co., Bridgeport, O.; Apollo Iron & Steel Co., Vandergrift, Pa.; Cambridge Iron & Steel Co., Cambridge, O.; Canton Rolling Mill Co., Canton, O.; Chartiers Iron & Steel Co., Carnegie, Pa.; Chester Rolling Mill Co., East Liverpool, O.; Corning Steel Co., Hammond, Ind.; Coshocton Rolling Mill Co., Coshocton, O.; Dennison Rolling Mill Co., Dennison, O.; Dresden Iron & Steel Co., Dresden, O.; Falcon Iron & Nail Co., Niles, O.; Hyde Park Iron & Steel Co., Hyde Park, Pa.; Kirkpatrick & Co., Leechburg, Pa.; P. H. Laufman & Co., Paulton, Pa.; Midland Steel Co., Muncie, Ind.; New Philadelphia Iron &

Steel Co., New Philadelphia, O.; Old Meadow Rolling Mill Co., Scottsdale, Pa.; Pittsburgh Sheet Mfg. Co., Shousetown, Pa.; Piqua Rolling Mill Co. (Cincinnati Corrugating Co.), Piqua, O.; Reeves Iron Co., Canal Dover, O.; Republic Iron & Steel Co.'s sheet mills outside of Alabama; Saltsburg Rolling Mill Co., Saltsburg, Pa.; Scottdale Iron & Steel Co., Scottsdale, Pa.; Struthers Iron & Steel Co., Struthers, O.; W. Dewees Wood Co., McKeesport, Pa.; Wellsville Plate & Sheet Iron Co., Wellsville, O.; West Penn. Sheet Steel Co., Leechburg, Pa.; Sharon Iron Co., Sharon, Pa.

BUILDER'S TRIAL TRIP OF BATTLESHIP ILLINOIS.

The builder's trial trip of the battleship Illinois was held off the Virginia coast, Tuesday of this week. The sea was smooth and the attending circumstances favorable. It was the opinion of those on board that the Illinois is superior to the Kearsarge and Kentucky, which were also built by the Newport News Ship Building & Dry Dock Co. Seventeen knots is the lowest prediction made for her on the official trial trip, which occurs in May. The trial was made to test the engines, boilers and auxiliary machinery, and no attempt was made at speed. William A. Post, the general superintendent of the Newport News company, said:

"The Illinois exceeded all expectations. I am confident that we will get 17.2 knots out of her on the official trial trip. She is faster than the Kearsarge or the Kentucky. Her engines and boilers could not have worked better."

Capt. A. G. Converse, who will command her, said: "I am very well pleased with the day's trial, which convinced me that the Illinois is a splendid ship—staunch, steady and speedy. The machinery could not be better. All of the officers are delighted with the vessel."

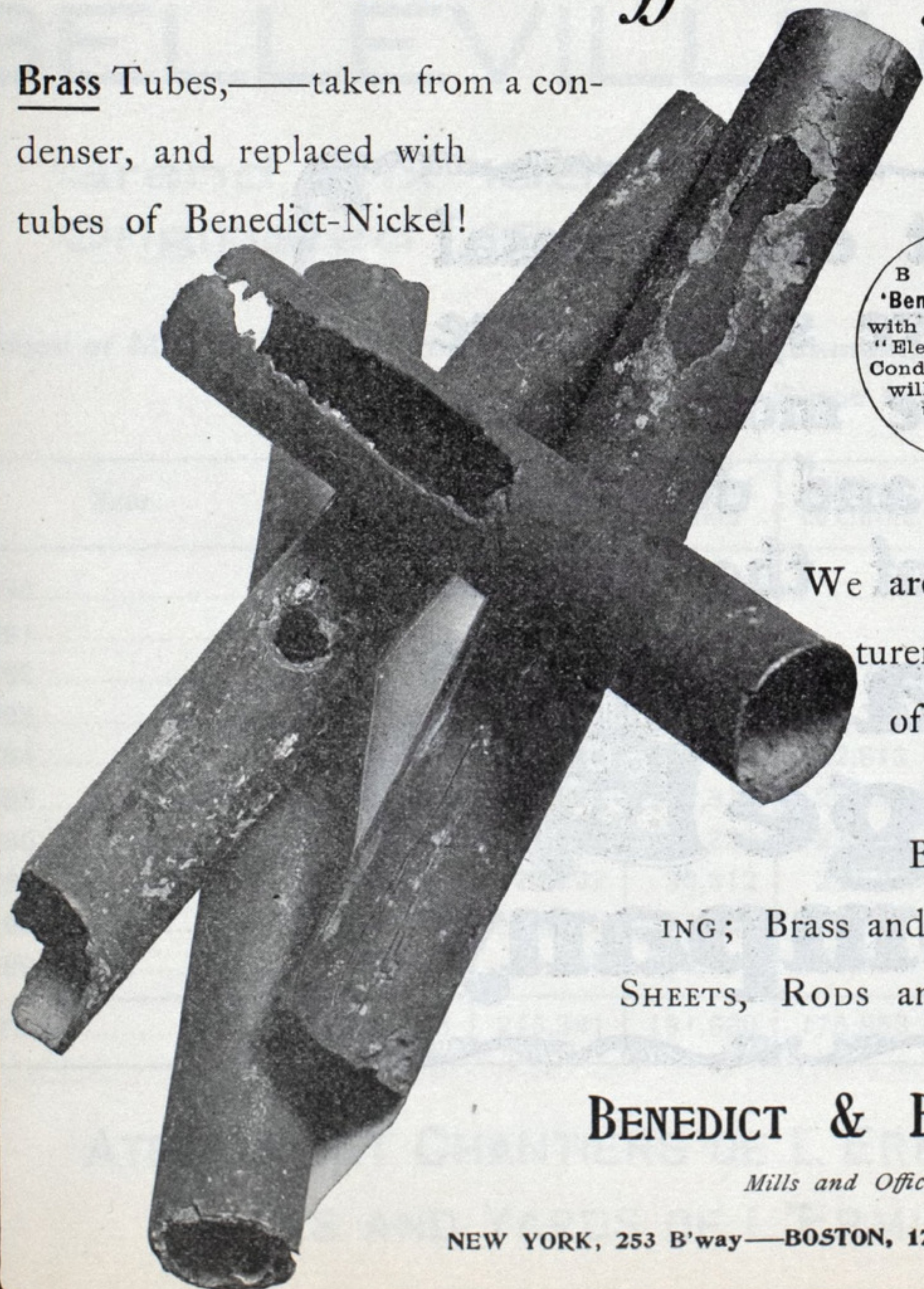
VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland,
Date of March 13, 1901.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	39 1/8	39 1/4	38 7/8	39
American Steel & Wire, Pfd.....	97 3/8	97 1/2	97 1/4	97 3/8
Federal Steel	43 7/8	43 7/8	43 1/4	43 1/4
Federal Steel, Pfd.....	89 1/4	89 7/8	89 1/4	89 3/8
National Steel	45 1/2	45 1/2	44 1/2	45 3/8
National Steel, Pfd.....	102	102 1/4	102	102
American Tin Plate	62	.....	.....	62
American Tin Plate, Pfd.....	101 5/8	102	101 1/2	102
American Steel Hoop.....	36 1/2	36 7/8	36 1/2	36 1/2
American Steel Hoop, Pfd.....	81 1/4	81 3/4	81	81 1/2
Republic Iron & Steel	16 3/4	16 3/4	16 1/8	16 3/4
Republic Iron & Steel, Pfd	67	67	66 1/4	66 5/8

The effect of Electrolysis

Brass Tubes,—taken from a condenser, and replaced with tubes of Benedict-Nickel!



A
Booklet on
"Benedict-Nickel,"
with a treatise on
"Electrolysis of
Condenser Tubes,"
will be mailed
upon re-
quest.

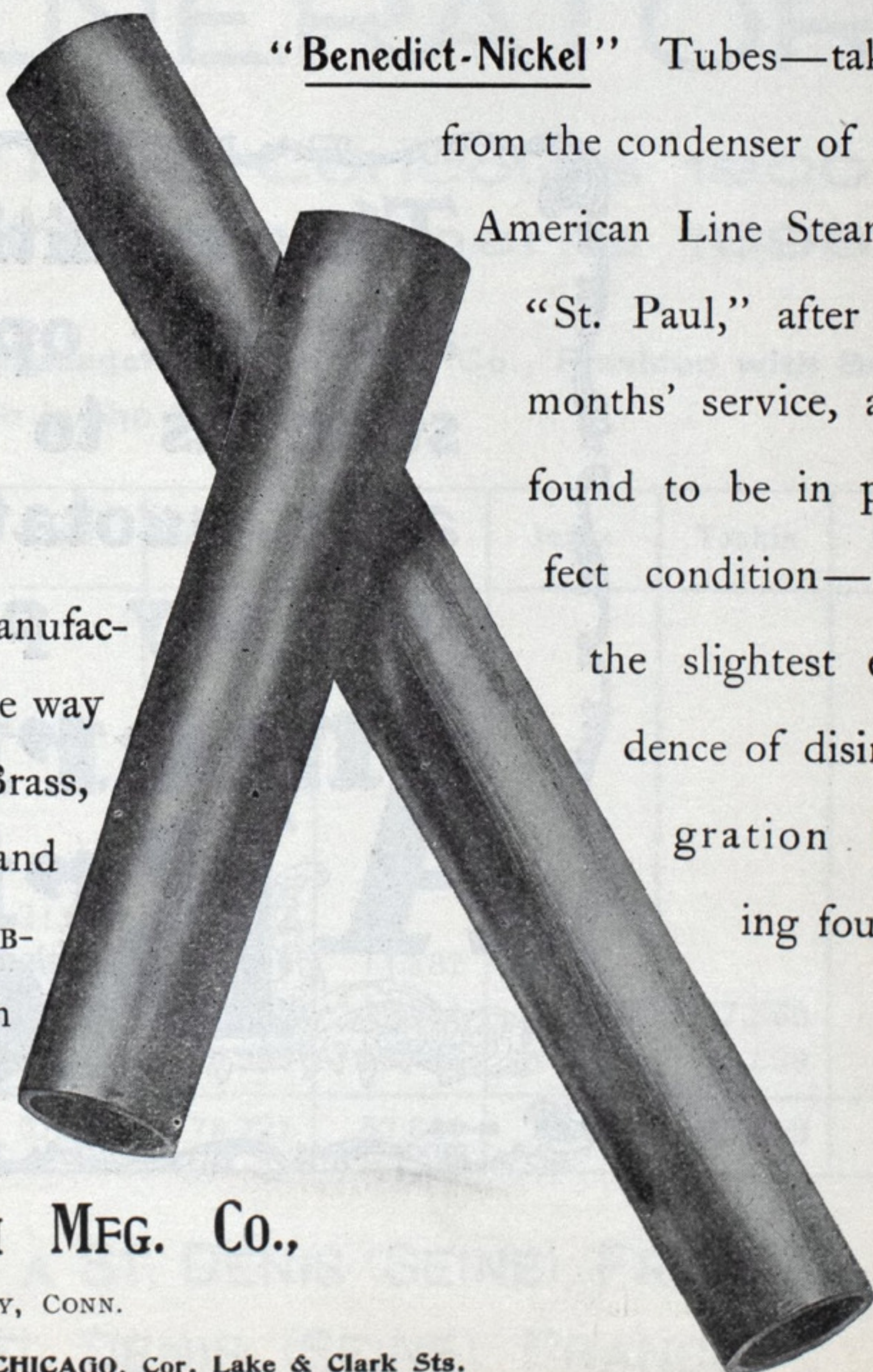
We are also manufac-
turers in a large way
of Seamless Brass,
Copper and
Bronze TUB-
ING; Brass and Copper in
SHEETS, RODS and WIRE.

BENEDICT & BURNHAM MFG. CO.,

Mills and Offices, WATERBURY, CONN.

NEW YORK, 253 B'way—BOSTON, 172 High St—CHICAGO, Cor. Lake & Clark Sts.

"Benedict-Nickel" Tubes—taken from the condenser of the American Line Steamer "St. Paul," after 28 months' service, and found to be in perfect condition—not the slightest evidence of disintegration being found.



TRADE NOTES.

The Olds Motor Works of Detroit was completely destroyed by fire a few days ago. The loss is about \$75,000. Steps will be taken immediately for rebuilding. This concern, manufacturing gas engines, automobiles and other vehicles, had been unusually successful of late. The structure destroyed by fire was modern in every way, as it had been erected only a little more than a year ago.

J. S. Leslie of Paterson, N. J., is the manufacturer of the Taufel & Leslie reducing pressure valve, which is very highly spoken of by engineers qualified to judge as to the merits of reducing valves. These valves are being placed on all the ships of the navy, having during the past two years stood remarkably well under trying phenomenal tests. Many ocean liners and coasting vessels are being fitted with these valves, while thousands of them are in use on locomotives and in stationary steam plants.

The Stamford Foundry Co., Stamford, Conn., is one of the few concerns which makes a specialty of making ranges for use on board ships. This company has two distinct products on the market, named the "Yacht" and "Shipmate," respectively. While primarily these ranges were intended for use on smaller vessels, they are now being supplied to large ones. The company has recently received orders to equip the two six-masted schooners, Eleanor A. Percy and George W. Wells, and the two five-masters, Van Alens-Broughton and Oakley C. Curtis, with these ranges. The company sends out descriptive matter upon application.

A report from the Roberts Water Tube Boiler Co. of New York is to the effect that orders received within the past four months amount to about \$100,000. A Roberts boiler recently furnished to one of the medium-size revenue cutters makes the eighth boiler sold to the United States revenue cutter service. Within a very short time this company has furnished seven boilers to the Osgood Dredge Co., each of them developing about 300 H.P. Among boilers under construction are one each for the Pennsylvania Railroad Co., to be installed in the tug West Jersey, for the tug C. A. Dickey of Gloucester, Mass., and for a tug building at Buffalo for Messrs. Dunbar & Sullivan.

New shops of the Colorado & Southern Railway, just completed at Denver, Colo., are noticeable for the introduction of many features conducive to the comfort and welfare of the workmen. Among these is a complete equipment for both ventilating and heating the entire plant by the blower system. Separate apparatus, furnished by the B. F. Sturtevant Co. of Boston, Mass., consisting of fans and heaters, are installed in the machine and car shops. Air distribution is secured through a complete system of galvanized iron piping. A clear atmosphere is also maintained in the forge shop by means of a large Sturtevant exhaustor, arranged to draw the smoke and gases from eighteen special down-draft forges, also furnished by the same company.

A beautiful catalogue has just been issued by the Waterbury Rope Co., 69 South street, New York. The company are makers of ingots, billets and wire rods, drawers of wire, manufacturers of iron and steel wire rope of every description, and also of manila and sisal rope and binder

twine. In the preface the company say: "Since our 1898 catalogue was issued we have increased the capacity of our works by the completion of a new plant for the manufacture of wire rope. We not only make the rope, but also draw and temper our own wire, roll our own rods and manufacture the steel. Our wire rope department was installed about two years ago. The machinery is the product of the most experienced makers in this country and abroad. The plant stands as one of the most modern mills in the country." The frontispiece of the catalogue is an excellent washdrawing of the company's plant.

A prospectus announces that the water tube boiler business of Egbert P. Watson of Elizabeth, N. J., who is well and favorably known in marine engineering circles, has been incorporated. The corporate name is the Watson Water Tube Boiler Co. The capital is \$250,000, guaranteed, full-paid, non-assessable. The General Commercial & Trading Co., 16 Broad street, New York, are fiscal agents. Mr. Watson is president and general manager, C. Addison Swift vice-president, and Wm. McCulley, Jr., secretary and treasurer. Miers Coryell, consulting engineer of New York, F. Meriam Wheeler of the Geo. F. Blake Co. and John V. Beekman of the Lidgerwood Mfg. Co., all well known among leading mechanical engineers of the country, are members of the board of directors. The incorporation is for the purpose of securing additional capital to extend the scope of the Watson works and manufacture on a larger scale than the inventor is now able to do. For security of investors the principal of the stock is to be guaranteed for thirty years by a large financial institution, which will issue its maturity bonds of the same face value as the stock. For the purpose of raising additional capital promptly, the new company is offering a block of its stock, par value \$100, at a reasonable discount.

The Buffalo Forge Co. has just issued four tasty little booklets. One is devoted to the typical features of mechanical forced draft, the advantages of which are claimed to be as follows: Coal saved; low grades of fuel burned; smoke prevented by a proper mixture of hard and soft coal or screenings; simplicity of installation; initial cost far less than a chimney; meets promptly sudden demands for steam. The book is embellished with illustrations of the fans manufactured by the company. The second book is devoted to mechanical induced draft, of which the following are the advantages claimed: Building space economized; the highest possible efficiency of combustion afforded; absolute independence of atmospheric conditions and exit temperature of gases secured; provides a constant boiler pressure by automatically controlling the fan speed. The third book is devoted to the typical features of Buffalo down-draft forges, the principle of which is exclusively owned by the company. This is represented to be the most durable and efficient system of forge construction known. Buffalo down-draft forges taken from burned buildings have been reinstalled without repairs. The fourth book deals with the Buffalo Forge Co.'s engine. Its advantages are accessibility of parts, consistent lightness, stability, economy and exceptionally high continuous speeds. For marine lighting sets it is claimed that a record hitherto unreachd has been established.

**The facilities at our disposal
and our operative system are
such as to insure most favor-
able quotations and deliveries
for any part of the world.**

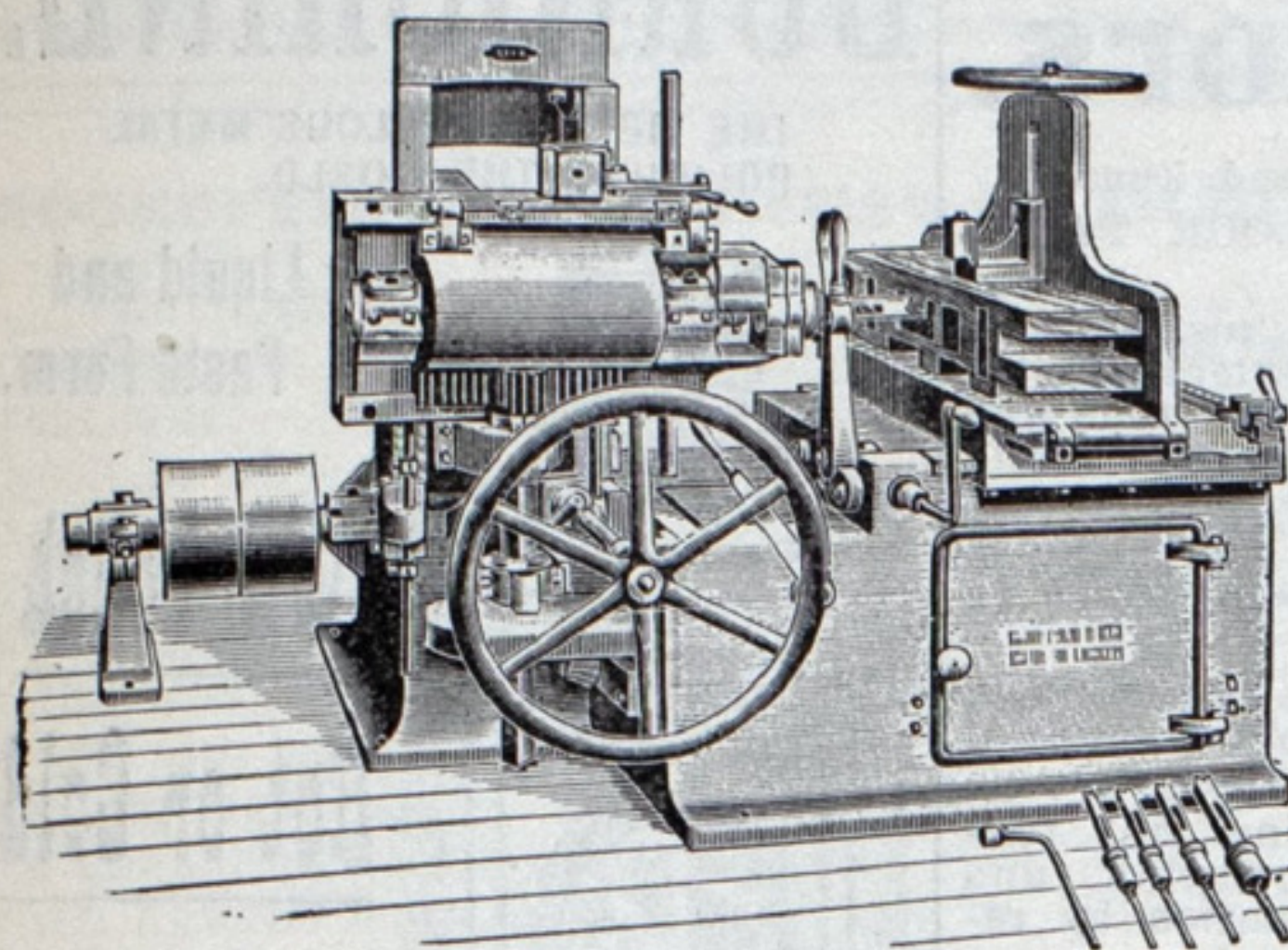
**American
AB
Bridge
Company**

GENERAL OFFICES
100 BROADWAY
NEW YORK

21-162.

HOLLOW-CHISEL MORTISER AND BORER.

A machine especially adapted to ship yards and car shops and to establishments in which large timbers are worked, is illustrated herewith. Owing to mechanical advantages and labor-saving appliances embodied in this machine, the manufacturers, J. A. Fay & Egan Co. of Cincinnati,



say they are putting it on the market with the firm conviction that it will accomplish to perfection the work for which it is intended. Especial attention is called to the following features of the machine:

First—It will cut a mortise from 1/8 to 10 in. deep, in either hard or soft wood; will make tenons (end), gain or mortise clear through a 10-in. timber, and will also countersink for bolt heads. The machine will also take stock up

to 16 in. wide and 15½ in. deep, and will cut a gain at the top of a 13-in. timber.

Second—The column is cored, strongly braced and capable of withstanding any strain. The bed rests on the main column held by gibs and fitted with stops to gage-depth of mortise, can be moved endwise for long mortises, and is fitted with adjustable stops to regulate their lengths.

Third—The chisel frame and its chisel and auger are adjusted to different heights by hand wheel, stops being provided to gage the movements of the chisel with locking device to hold it in position. Its reciprocating motion is produced by gear operated in rack at its side, with driving force near the chisel line. The forward and backward movement is automatic and under instant control of the operator.

Further particulars concerning the machine will be cheerfully given on application to the manufacturers, J. A. Fay & Egan Co., 325 to 345 West Front street, Cincinnati, O., who will also furnish lowest terms.

As a result of a record kept on the Detroit river mail boat, Postmaster F. B. Dickerson of Detroit was enabled to state at the close of the last season of navigation that vessel passages in the Detroit river during the season numbered 22,465. It is not probable that the men aboard the mail boat could ascertain with any degree of satisfaction the number of tons of freight passing the city of Detroit in lake vessels, but they could without great difficulty note the name of every vessel passing through the

river. Then at the end of each month, or at the end of the season, the registered tonnage of the vessels could be readily secured and an accurate statement could be made of not only the number of the vessels but also their tonnage. The tons of freight passing through the river would be more desirable, but if this cannot be had, why not secure the next best statement, that of vessel tonnage? As we have nothing now in the way of reliable statistics of Detroit river commerce, the Detroit river mail service would certainly add to its present popularity by acting upon this suggestion.

Mr. E. T. Chamberlain, United States commissioner of navigation, on March 9 authorized the Tonawanda Iron & Steel Co. of North Tonawanda, N. Y., owners of the wooden steamer W. H. Gratwick, to change her name to Fleetwood. The change will be welcomed by shipping interests of the great lakes, as there is a steel steamer that bears the name W. H. Gratwick. As showing the requirements of the treasury department the following is extracted from the official notice of this change: "It appears from the records and from proof furnished by the owners that said vessel was built in the year 1887 A. D.; official number, 81,145; measures 1,687 gross tons; that said vessel is free from debt, and seaworthy; that said vessel is fourteen years old, and not less than 40 per cent. of said vessel's first cost has been expended for repairs; that said vessel was given her name at least five years prior to the authority for change of name, and that said vessel is to have new boilers."

A contract for thirty-six bridges has been placed with the American Bridge Co. by the Chicago, St. Paul & Missouri Ry.

Settlers' rates via the Nickel Plate road—Beginning with Tuesday, Feb. 12, low rate settlers' tickets will be on sale every Tuesday to and including April 30, to Oregon, Montana, Washington and all points in the Northwest. Write, wire, 'phone or call on the nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O.
10 April 30.

"Seaboard Steel Castings."

MANUFACTURERS OF
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST
STOCKLESS ANCHOR.
APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON
ORDER, OR STOCK ORDERS
PROMPTLY FILLED.

A GUARANTEE OF QUALITY.

OPEN-HEARTH STEEL CASTINGS
OF THE HIGHEST GRADE.
FACILITIES FOR CASTINGS UP TO
80,000 POUNDS WEIGHT.

MACHINE WORK AND PATTERNS
FURNISHED WHEN REQUIRED.

RAIL OR WATER DELIVERIES.

CAPACITY, 1500 TONS PER MONTH

Seaboard Steel Casting Co.,
CHESTER, PA.

The Marine Review wants a representative in every city on the Great Lakes.

BELLEVILLE GENERATORS

Grand Prix 1889
Originated 1849

Hors Concours 1900
Latest Improvements 1896

Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australian	Polynesian	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890.....	22,576	820									
1891.....	22,749	22,777	68								
1892.....	22,749	22,801	23,274	7,753							
1893.....	22,793	22,781	22,762	22,749							
1894.....	22,813	22,789	22,858	22,813	12,567						
1895.....	22,891	22,922	22,913	22,936	13,629	9,571					
1896.....	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897.....	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898.....	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899.....	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total.....	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

SHIP REFRIGERATION.

The American Linde Refrigerating Co. of No. 45 Broadway, New York city, distributes a little work on refrigerating machinery (it is more than a catalogue) that will prove highly interesting to anyone having to do with this branch of engineering on ship board. Of course it deals with the subject on broader lines than ship refrigeration, as there are some 5,000 Linde plants at work in establishments of all kinds throughout the world, but there is a chapter devoted especially to the kind of machine that is suited to vessels. This company has made ship refrigeration a special study. Over 500 plants have been supplied and erected on board ships, ranging in size from one ton to 200 tons cooling capacity, and including all kinds of vessels from the private yacht to the largest of the Atlantic liners. Among governments and municipalities that adopted Linde apparatus previous to the organization of the American company are the following: Governments—British, German, French, Austrian, Italian, Canadian, New South Wales, Victoria, Queensland, Holland, New Zealand, etc., etc. Municipalities—London, Glasgow, Greenwich, Edinburgh, Manchester, Liverpool, Bristol, Cardiff, Aberdeen, Hull, Leeds, Berlin, Hamburg, Cologne, Leipsic, Dresden, Munich, Melbourne, Paris, Sydney, etc., etc.

Marine trade is quite an important part of the business of the Durable Wire Rope Co., No. 228 Congress street, Boston. In a letter to this company the superintendent of the French line of steamers says: "We have been using for a year your rope for coaling, unloading and loading our ships and find it a good deal better than any manila rope. Dampness does not make it swell and it is light and perfectly pliable. The first time we tried your rope we were so much pleased that we did not use manila rope any more after that."

W. D. Forbes & Co. of Hoboken, N. J., will build the circulating pumps, air pumps and boiler feed pumps to be used on the high speed yacht Arrow, and will also furnish engines to drive the blower and electric plant.

A bust of Chas. H. Haswell, the first engineer-in-chief of the United States navy, has been placed in the Union Club, New York.

To Chicago via B. & O.—Daily trains, through sleeping cars, 6:35 and 9:35 p. m. \$8.50 first, \$7.00 second class. Mar. 28.

Ahead of all Competitors.

That's what our patrons say and know. They are talking about GARLOCK PACKINGS.

There are none better, and the "just as good kind," which unprincipled dealers will try and palm off on you, is indifferent and inferior stuff, the use of which will surely disappoint and make trouble for you.

We will co-operate with you in every way in the successful use of reliable packings on your plant.

No matter what trouble you are experiencing in this connection we will overcome it if you will give us an opportunity.

Write our nearest office, giving full particulars as to your requirements, and your wants will receive attention by return mail.

Send for catalogue and samples to our nearest office.

THE GARLOCK PACKING CO.



New York. Philadelphia. St. Louis.
Boston. Pittsburg. Denver.
Chicago. Cleveland. San Francisco.

MAIN OFFICES AND FACTORIES:
PALMYRA, N. Y.; ROME, GA.

BURNISHINE.

THE MOST MARVELOUS METAL POLISH IN THE WORLD.



In Liquid and Paste Form.

Will Polish

Hot or Cold

Metal,

no matter which.

Produces a wonderfully brilliant lustre on brass, copper, nickel and all metals, no labor required.

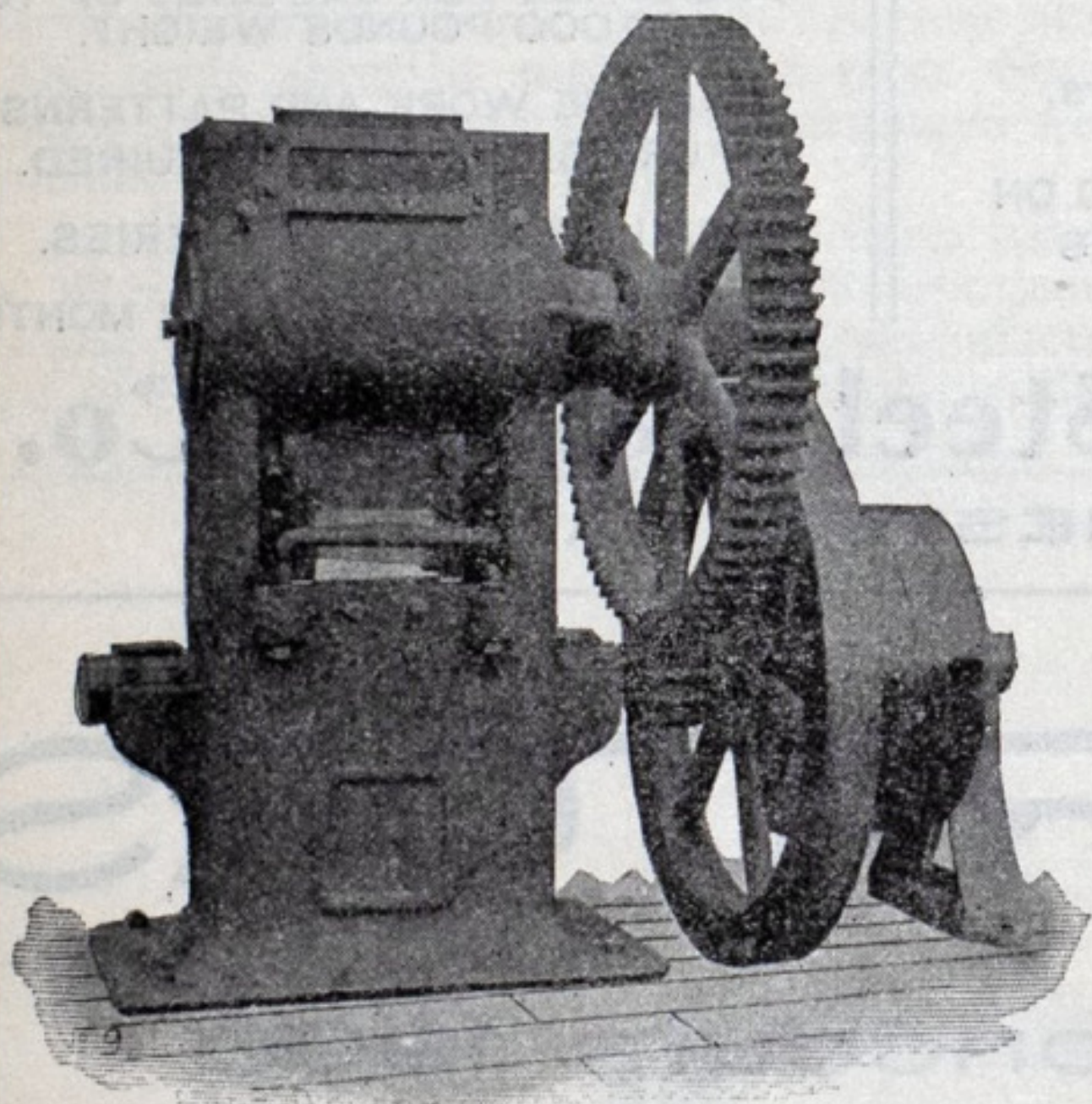
Used on steamers all over the world. Free samples on application.

J. C. PAUL & CO.

57 Dearborn St., CHICAGO, ILL.

THIS ILLUSTRATES OUR

BAR SHEAR



which we build in five different sizes. This is a very handy tool for cutting rods, bars and odds and ends of various kinds.

- No. 1 has a capacity to cut 1" round iron.
- No. 2 has a capacity to cut 1 3/4" round iron.
- No. 3 has a capacity to cut 2 1/4" round iron.
- No. 4 has a capacity to cut 3" x 3" billets.
- No. 5 has a capacity to cut 4" x 4" billets.

We shall be pleased to furnish further particulars regarding this machine.

The Cleveland Punch and Shear Works Co., CLEVELAND, O., U. S. A.

SCANDINAVIAN SHIP BUILDER.

Twenty years' experience with largest firms; also as marine constructor. Open for engagement as general manager for ship yard and engineering work, or for ship yard only. Scandinavian, English and German languages spoken. Age, forty-two. Member Institute Naval Architects. First-class recommendations. Apply to Olaf A. Ryens, Advertising Office, Christiania, Norway. Mar. 14.

Passenger Steamer Mary for Sale.

Length, 100 ft.; beam, 20 ft.; depth, 8 ft.; tonnage, 118. Fore-and-aft compound engine, 10 and 20 in. cylinders by 16 in. stroke. Boiler allowed 150 pounds of steam. Passenger capacity 350. For further information apply to Capt. Sam. Burnham, Port Huron, Mich. Mar. 14.

TO CLOSE AN ESTATE.

We offer for sale the entire plant of J. B. Wilson & Co., Detroit, Mich.,—foundry, machine shop, blacksmith shop, office and storeroom buildings, with patterns, machinery and tools; or will lease to responsible parties for a term of years. Address J. B. Wilson & Co., Detroit, Mich. tf

Patterns and Drawings for Sale.

Complete patterns and working drawings for 6 by 6 in. duplex hoisting or deck engine and pumps. J. B. Wilson & Co., Detroit, Mich. tf

STEAM YACHT FOR SALE.

A small, nicely-equipped, private steam yacht in perfect order. Dimensions: Over all, 57 ft.; beam, 8 ft.; draught, 4 ft. 2 in. Commodious forward and after deck with large pilot-house and comfortable trunk cabin. Having purchased a larger yacht, will sell this at a great sacrifice. Full particulars will be given by addressing O. P. Letchworth, Buffalo, New York. Mar. 28.

Patterns for Compound Engine for Sale.

Complete patterns and working drawings for fore-and-aft compound engine, 15 and 27 in. by 22 in. J. B. Wilson & Co., Detroit, Mich. tf

Schooner L. S. Hammond For Sale.

We offer this vessel at a very reasonable price. She is at our dock in this city, where she can be seen and examined. Full particulars will be given by calling at our office or writing to address below. Ogdensburg Coal & Towing Co., 44 & 46 North Water street, Ogdensburg, N.Y. Mar. 21.

TUG FOR SALE AT A BARGAIN.

Fishing tug Fred King. One of the best on Lake Erie. Robison Basket Co., Painesville, O. Mar. 25.

FREIGHT AND PASSENGER STEAMER

A. B. Taylor is for sale. Vessel 106 ft. keel, 22 ft. beam. Freight capacity, 115 tons; passengers, 200. Electric light; good sea boat; speed, 11 miles; economical. E. C. Dunbar, Grand Haven, Mich. April 4

LUMBER CARRIERS FOR SALE.

Stmr. White Star	capacity	350,000 feet.
Barge Eva S. Robinson	"	560,000 "
Schr. Annie P. Grover	"	340,000 "
Schr. John Miner	"	350,000 "

All A2 and A2 1/2 and in good condition. Arthur B. Slyfield, Port Huron, Mich. Mar. 21

FIVE ELECTRIC PASSENGER LAUNCHES FOR SALE.

In fine condition. Length over all, 35 feet. Seating capacity, 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago. tf